Environmental Statement: Volume III

Appendix 11D: Phase 2 Interpretative Report

April 2019

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VPI Immingham Energy Park

Phase 2
Geotechnical & Geo-environmental Interpretative Report

VPI Immingham LLP

Project number: 60569745

31/08/2018

Quality information

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The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between **[10/4/18]** and **[31/8/18]** and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report.

The exploratory holes carried out during the fieldwork, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The comments made and recommendations given in this Report are based on the ground conditions apparent at the site of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this Report.

The comments made on groundwater conditions are based on observations made during site work and the limited monitoring programme. It should be noted that groundwater levels might vary owing to seasonal or other effects.

The site reconnaissance consisted of a general external inspection of the site aimed at identifying any obvious signs of geotechnical hazards and potential sources of ground contamination affecting the site.

Any risks identified in this Report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and actual risks can only be assessed following a physical investigation of the site.

The investigation itself was designed generally to meet the objectives of an exploratory investigation, as defined by BS10175:2011 Investigation of Potentially Contaminated Sites: Code of Practice (BSI). As an exploratory, the results may not provide sufficient data to make detailed estimates of the quantities involved in any remediation work, if required.

The opinions expressed in this Report concerning any contamination found and the risks arising there from are based on current good practice simple statistical assessment and comparison with available soil guideline values, AECOM generic assessment criteria and other guidance values.

It should be noted that the effects of ground and water borne contamination on the environment are constantly under review, and authoritative guidance values are potentially subject to change. The conclusions presented herein are based on the guidance values available at the time this Report was prepared, however, no liability by AECOM can be accepted for the retrospective effects of any changes or amendments to these values.

Table of Contents

Glossary of Terms

AC:	Aggressive Chemical Environmental for Concrete Class,
ACEC:	Aggressive Chemical Environmental for Concrete,
BGS:	British Geological Survey,
BH:	Borehole,
CBR:	California Bearing Ratio,
CEMP:	Construction Environmental Management Plan,
CFA:	Continuous Flight Auger,
CHP:	Combined Heat and Plant,
CS:	Characteristic Situation,
CU:	Consolidated Triaxial Test,
DOC:	Dissolved Organic Carbon,
DS:	Design Sulphate,
DWS:	Drinking Water Standard,
EQS:	Environmental Quality Standard for controlled waters
GAC:	Generic Assessment Criteria,
GQRA	Generic Quantitative Risk Assessment,
HC:	Hydraulic Cell,
INDEX:	Classification tests, including moisture content, Atterberg limits,
LPG:	Liquid Petroleum Gas,
M bgl:	Metres Below Grounds Level,
M OD:	Metre Above Ordnance Datum,
OCGT:	Open Cycle Gas Turbine,
OD:	Ordnance Datum,
OED:	Consolidation Tests,
ORP:	Oxidation-Reduction Potential,
PAH:	Polyaromatic Hydrocarbons,
PID:	Photo Ionisation Detector,
PCB:,	Polychlorinated Biphenyl
PPE:	Personal Protective Equipment,
PSD:	Particle Size Distribution,
SPT:	Standard Penetration Testing,
SVOCs	Semi Volatile Organic Compounds,
TP:	Trial Pit,
TICs:	Tentatively Identified Compounds,
TOC:	Total Organic Carbon,
TPHs:	Total Petroleum Hydrocarbons,
TPH-CWG	Total Petroleum Hydrocarbons- Criteria Working Group,
TT:	Trial Trench,
UU:	Unconsolidated undrained triaxial test,
UXO:	Unexploded Ordnance,
VOCs:	Volatile Organic Compounds,
WTV:	Water Target Value,
WS:	Window Sample Hole,

EXECUTIVE SUMMARY

	Conclusions	Recommendations
Ground Conditions	The results of the 2018 ground investigation by SOCOTEC UK Ltd shows that the site consists of up to 1.7m thickness of variable cohesive and granular Made Ground, underlain by cohesive Glacial Till with occasional layers of Glacial Sands and Gravels. The cohesive Glacial Till is typically described as firm to stiff, sandy, gravelly, clay with a low to medium compressibility index. A number of boreholes encountered highly weathered chalk from the Burnham Chalk Formation between the depths of 21.5m bgl and 27.5m bgl. Without geotechnical laboratory testing information available for the chalk formation, it is not possible to provide characteristic parameters. Borehole records and in-situ tests for the cohesive and granular Made Ground show that the material is highly variable and conservatively classified as soft or loose. As a conservative assumption, the occasional Glacial Sands and Gravels layers have not been included in the parameter determination process. Borehole descriptions and geotechnical tests show that the Glacial Till is firm, becoming very stiff with depth material. Depending on the foundation solution and limiting criteria, the Glacial Till can be deemed as a relatively competent material. Further assessments can be undertaken at specific locations within the site to refine the engineering parameters and ground models presented in this report.	Caution should be taken when selecting engineering and construction solutions which interact with the Made Ground material. The performance of structures founded in made ground is difficult to predict due to its variable nature. Should engineering solutions, such as piles, need to penetrate the Burnham Chalk Formation, further GI information will be required to develop a safe design.
Building Foundations	Both spread and piled foundation solutions may be considered for the proposed structures for the site. Foundation selection will depend on proposed loadings, foundation geometry and structural tolerance to total and differential settlement. Bearing resistance and tolerance to settlement will need to be considered for any spread foundations. Spread foundations should be located within natural ground below any fill or Made Ground, and founded below the depth of effect of variations due to vegetation, seasonal and climatic change. Piled foundations may be considered for structures depending on proposed loadings, foundation geometry or where settlement tolerances is an issue, or where spread foundations are found to be unsuitable. Piles may derive capacity from a combination of skin friction and end bearing in the superficial soils. Two design approaches can be adopted for piled foundations; placing the buildings on individual pile caps/rafts or creating a piled raft to cover large sections of the site. A piled raft will require a larger quantity of construction work but will ensure a stable design which will limit differential settlements between the buildings.	When considering shallow foundations, any soft, loose or deleterious deposits encountered at formation level should be removed and backfilled with suitable engineered fill or mass concrete. Should the piles need to penetrate the Burnham Chalk Formation, further GI information will be required to develop a safe design. Continuous Flight Auger (CFA) would be the preferred piling method for the assessed ground conditions. However, advice should be obtained from a specialist piling contractor before confirming a final design.

<table>
<tr><td></td><td>Individual pile caps/rafts for separate buildings will allow for more flexibility in the pile design and enable costs to be optimised.</td><td></td></tr>
<tr><td>Excavations & Earthworks</td><td>Soft, loose or deleterious material will require to be removed from under proposed structures.
Considering the variable groundwater levels obtained from installations within the superficial deposits, and in view of the likelihood that long term equilibrium groundwater levels have not been recorded during the brief monitoring period, provision should be made for pumping from sumps to control ingress of groundwater into excavations in the event that water bearing granular bodies are encountered.
Excavation should be possible using conventional site plant.</td><td>All excavations should be battered back to a safe angle as determined on site or be provided with close/continuous support and or stabilisation measures. Any temporary excavated slopes which are likely to receive fill are to be benched prior to filling.
If earthworks are proposed it is recommended that slope stability analyses are undertaken at detailed design stage to establish maximum permissible slope angles.
It is recommended that provision is made for pumping from sumps to control ingress of groundwater into excavations in the event that water bearing granular bodies are encountered</td></tr>
<tr><td>Retaining Walls</td><td>Similar to spread foundations, foundations for retaining walls should be located within natural ground below any fill and Made Ground.</td><td>If any soft, loose or deleterious deposits are encountered at foundation and or formation level, these should be removed and backfilled with well compacted suitable engineered fill or mass concrete.
Due to the low permeability of the Glacial Tills, it is possible that the equilibrium water levels within the standpipes have not yet been reached, therefore a conservative approach is recommended for the selection of design groundwater levels for retaining wall design.
Groundwater levels should continue to be monitored at monthly intervals to determine equilibrium levels and seasonal variations prior to detailed design.
Adequate drainage measures to the rear of retaining walls should be designed to prevent the build-up of water pressure against the retaining walls.</td></tr>
<tr><td>Infrastructure</td><td>Levels of Sulphate and pH which can aggressively attack concrete have been identified for the section.
Potentially toxic and corrosive chemicals and elements have been encountered in both total soils testing and leachate samples taken in this section that may pose a risk to new/ diverted water supply pipes.</td><td>The recommended design class sulphate and ACEC Classification for various concrete structures are presented below
<table>
<tr><th>Stratum</th><th>Undisturbed ground Classification</th><th>Disturbed ground Classification</th></tr>
<tr><td>Made Ground</td><td>DS-2, AC-2</td><td>DS-2, AC-2</td></tr>
<tr><td>Glacial Deposits</td><td>DS-1, AC-1</td><td>DS-3, AC-3</td></tr>
</table>
Advice should be sought from United Utilities, including completing their risk assessment process, to assist in the specification of drinking water supply pipes prior to installation.</td></tr>
</table>

Human Health	Risk assessment based on conservative assumptions does not indicate any risk to human health for the current or proposed land use. An appropriate CEMP and the use of standard PPE will be sufficient to protect construction workers from contact with substances present in the soil, given the concentrations encountered during the ground investigation	No remedial actions are required to protect current site users or future site users from substances in the soils. The stage 2 risk assessment does not assess the specific risks to construction workers, but appropriate PPE and CEMP precautions will be sufficient to mitigate risk to construction works.
Groundwater	Assessment of risks to controlled waters from leachable (soluble) concentrations of potentially polluting substances in soil, when compared conservatively against DWS and EQS, show a number of exceedances. However, this is not reflected in the groundwater below the site and the distance to sensitive surface waters makes the possibility of harm to sensitive controlled waters from leachable soil substances unlikely. There are concentrations above the relevant screening criteria for a variety of contaminants in the soils below the site and deep foundations may create pathways through less permeable layers from the unsaturated zone to sensitive groundwater below. However the risks associated with deep foundations can be mitigated by means of risk assessment specific to the design and construction proposals.	No remedial measures are required on site to protect controlled waters. However any piles should be designed in accordance with the EA guidance entitled *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (2001)*
Ground Gas	A preliminary assessment of measured gas concentrations and flow rates in accordance with BS8485:20015 has determined that the overall 'Characteristic Gas Classification' for the site is Category 2.. This is a category defining a low to moderate risk which would necessitate a relatively low level of protection against the ingress of gas to confined spaces in the development. Bs8485 provides guidance on the design of protective measures against the ingress of ground gas based upon a system of scores related to the level of risk prevalent at the site. It is considered that in accordance with published guidance and BS8485, the majority of the proposed power generation plant and buildings on site would fall into a Type D industrial style buildings which for a CS2 will require gas protection sufficient to reach a score of 1.5.. However any smaller ancillary buildings will be classified as type C which will require measures sufficient to achieve a score of 2.5. However if Made Ground is removed as part of the pre-construction works the site would classify as CS1 where no protection measures are required.	Where required ground gas protection measures as defined in BS8485 should be incorporated in the buildings. Standard good health and safety practice and PPE should be specified within the Construction Phase Plan in order to protect construction workers from gas within confined spaces.
Ecological Receptors	The Humber Estuary and Rosper Road Pools represent ecological receptors, but the distance to the receptor is such that harm is unlikely to be caused.	Although it is not considered the site is a significant risk to statutory ecological receptors . a landscape architected should be provided with the chemical analysis in order to establish suitable plant species for the site.
Reuse of material		Material encountered during construction works that is considered to be potentially contaminated through visual or olfactory evidence, or different to that assessed in the ground investigation will require chemical testing to confirm suitability for reuse.
Imported Materials		Imported material (e.g. fill, etc.) will require chemical and geotechnical testing before being brought onto site to demonstrate that it is suitable for use. The testing suite and frequency, along with validation requirements, should be agreed with the Contaminated land Officer at the Local Authority prior to importation of material.

1. Introduction

1.1 Terms of Appointment

AECOM were appointed by VPI Immingham LLP to undertake works comprising a ground investigation and interpretive report as described in the Ground investigation Fee Proposal Dated 02/03/18.

1.2 Background

The current Vitol Power International (VPI) Immingham LLP Combined Heat and Power plant (CHP) has been operational since 2004. The CHP plant produces steam which is supplied to the nearby Humber and Lindsey Oil Refineries. : It is understood that the CHP will be extended to the north of the site for the development of several gas fired power generation and storage projects including reciprocating engines and an Open Cycle Gas Turbine (OCGT) plant.. The development land is occupied by a car park and an area of open, hummocky land occupied by several vegetated mounds and ponded water in wet periods. The site location can be found in, and the proposed development can be found in Appendix A.

1.3 Scope and objective of the report

This Phase 2 Ground Investigation is concerned with the ground conditions at the proposed construction site of a new power generation and plant and buildings adjacent to the Humber and Lindsey Oil Refineries at Immingham, Humberside.

A ground investigation was undertaken to assist with the design of the proposals, including laboratory testing to determine soil properties and the installation of monitoring instruments to determine groundwater behaviour.

AECOM was commissioned by VPI Immingham LLP to provide design, management and full time technical oversight of the ground investigation works, which were completed by Socotec in April 2018; and to provide an interpretative and advisory report on the ground conditions in relation to development proposals.

The Ground Investigation comprised cable percussion and rotary drilled boreholes, trial pits and laboratory testing. The investigation was performed in accordance with the contract specification, and the general requirements of Eurocode 7, BS5930 (5930)and BS EN ISO 22475-1 (2006).

Following receipt of Socotec's factual report and the results of the laboratory testing, AECOM prepared a draft Geo-environmental and Geotechnical Interpretative Report. This includes an initial assessment of the results of the geotechnical testing and a discussion of possible foundation solutions and highways and pavement specification. The results of contamination testing of soil and groundwater samples have been screened against Stage 2 generic assessment criteria for human health and controlled waters receptors and provides an update to the conceptual site model outlined in the AECOM report *"VPI Immingham Phase I Geo-environmental Assessment"* (June 2017,).

1.4 Proposed Intrusive Investigation

Based on the findings of the Phase 1 desk study report and our understanding of the objectives for the site investigation and proposed redevelopment at the site, AECOM proposed the following scope for the ground investigation;

- GPR survey to make sure that the proposed exploratory locations were free from services;
- Drilling of six cable percussion boreholes to bedrock with potential follow on rotary coring to obtain samples of soil and rock for analysis of chemical and geotechnical properties, and installation of groundwater monitoring wells;
- Drilling of up to eight windowless samples into the underlying glacial till using dynamic sampling techniques to obtain in situ data, i.e. standard penetration testing (SPT), soil samples for chemical analysis and installation of gas/ groundwater wells;

- Excavation of up to ten trial pits and three trial trenches across the site to investigate potential made ground deposits present at the site including two large stockpiles;
- Installation of up to fourteen gas / groundwater monitoring wells;
- Logging of boreholes and trial pits in accordance with Eurocode 7;
- Headspace analysis of VOCs using a portable ionisation detector (PID);
- Well development to purge water and fines entrained in the filter pack during drilling;
- Completion of three gas / groundwater monitoring events including collection of groundwater samples;
- Analysis of soil and groundwater samples for a range of determinands and potential contaminants including heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), Total Petroleum Hydrocarbons Criteria Working Group, (TPH-CWG), asbestos, Volatile Organic Compounds (VOCs) and semi-Volatile Organic Compounds (SVOCs), major anions, and organic matter;
- Provisional characterisation of soils in stockpiles to assess waste classification in the event that offsite disposal is required;
- Analysis of soil and groundwater samples for analysis of BRE suite to assess concrete classification;
- Laboratory testing of soil and rock strength parameters, likely to include plasticity limits, particle size distribution, bulk and dry density testing, compaction and triaxial compression testing, and point load testing. The exact nature of the testing will be subject to the ground conditions encountered;
- Preparation of a factual site investigation report, detailing the works completed and including logs, photos and laboratory data;

Following receipt of the Factual Report from Socotec prepare a Phase 2 interpretative report including;

  - a detailed reassessment of the initial Conceptual Site Model (CSM), pollutant linkages and preliminary risk assessment, and an estimation and characterisation of the risks to a potential site development from contamination;
  - outline recommendations for risk mitigation;
  - identify need for additional investigation or remediation.

2. Existing Information

Existing information is discussed in the AECOM report *"VPI Immingham Phase I Geo-environmental Assessment"*, and is summarised here.

2.1 Site Description

The site is located off Rosper Road, Immingham, North East Lincolnshire (see Appendix A, Figure 1), and is approximately 2 km east of South Killingholme. The site is centred on National Grid Reference (NGR) TA 516641 618468.

The site is surrounded by a mix of industrial and agricultural land use, namely the Lindsey Oil Refinery to the North West, which is operated by Total Ltd. To the South West is the Phillips 66 Humber refinery. Directly to the east is agricultural land and the River Humber is located approximately 1.3km from the site. The current VPI Immingham site is located directly to the south of the proposed development site.

2.1.1 Site Layout

The site occupies a total area of approximately 5 hectares (ha). The northern area of the site is currently occupied by a car park and canteen building present in the northwest which may be removed prior to construction. The southern half of site is covered in shrubbery/ grassland and contains various stockpiles believed to be from previous development including construction on the refinery land. The site is bounded to the east by Rosper Road and to the south by the current VPI Immingham CHP plant. Immingham Port is located approximately 2.5km to the South East and the River Humber is located approximately 1.3km to the east.

2.1.2 Surrounding Land Use

Based on site reconnaissance the land use immediately surrounding the site was assessed and is summarised below:

- North: Directly north of the site there is an access road which links the Lindsey Oil Refinery and Rosper Road. Beyond this, various utility buildings belonging to the Oil Refinery as well as unoccupied parcels of land are present.
- East: An unnamed drain and Rosper Road are directly east of the site, beyond which there are agricultural fields.
- West: To the west of the site mapping shows a settling tank, pond, electricity pylon as well as a railway track linking into the Lindsey Oil Refinery
- South: A utility line containing gas and liquid hydrocarbon pipes is present to the south, separating the site and the current VPI Immingham CHP plant.

2.2 Anticipated Geology

The anticipated geology of the site was assessed through examination of Groundsure GeoInsight Report GS-3982431, publically available BGS borehole data and examination of historic reports made available to AECOM. Table 1 details existing ground investigations which have taken place on the site.

Table 1 . Previous Ground Investigations Reports

Contractor/ Consultant	Investigation Description	Date
Soil Mechanics	Interpretive Report on Ground Investigation 6 cable percussion boreholes (BH1 to 6) to a maximum depth of 25 m and 10 trial pits (TP1-3, CBR2, 3, 5, 7,9,10 &13) to a maximum depth of 2 m	2006
ABB	Surrender of Waste Management Licence 13 trial pits (TP4-16) and drilling of 3 boreholes (done by Soil Mechanics; BH3-BH5). Groundwater sampling was also taken from existing monitoring wells (BH7 & BH8) installed in 1991.	2006

Table 2 summarises the anticipated geological conditions underlying the site based on the data reviewed.

Table 2. Summary of Geological Sequence

Strata	Depth (m OD)	Thickness (m)	Comment	Source
Made Ground		Unknown	*"Soft to firm brown slightly sandy slightly gravelly clay with bands of soft black slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to medium of various lithologies including chalk and pottery."*	Ground Investigation by Soil Mechanics, 2006
Glacial Deposits		16-26	*"slightly sandy, slightly gravelly clay. The sand and gravel component comprises subangular to subrounded chalk, occasionally sandstone and shell fragments."*	Ground Investigation by Soil Mechanics, 2006
Burnham Chalk		Unknown	*"White, thinly-bedded chalk with common tabular and discontinuous flint bands; sporadic marl seams"*	BGS Lexicon

2.3 Hydrogeology and Hydrology

A review of Ordnance Survey maps indicated that the site is located approximately 1.3km south west of the River Humber, which flows north west to south east. Drains run along the southern and western site boundaries, and a small water storage pond is located approximately 80m west of the site. The Humber River is a designated Ramsar site, meaning that extra precautions are needed to safeguard hydrological features.

The site is located within an area whereby the Environment Agency issue flood warnings, and flood risk zone 3, meaning there is a high (greater than 1 in 100) annual probability of flooding. Flood defences are located along the banks of the River Humber and the area falls under the jurisdiction of North East Lindsey Internal Drainage Board.

Inspection of the Environment Agency Groundwater Vulnerability Maps indicates that:

- The superficial glacial deposits are classified as a 'Secondary Aquifer (undifferentiated)', defined either as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers', or 'lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering'.

- The bedrock, Burnham Chalk Formation, is classified as a Principal Aquifer, defined as 'highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes.

2.4 Regulatory Database Review

A Groundsure EnviroInsight Report was commissioned to evaluate any regulatory activities in the surrounding area which may have the potential to adversely affect the site. An initial Unexploded Ordinance report was also commissioned. The results of these searches are summarised below in Table 3 a plan showing the location can be found in the Groundsure EnviroInsight Report 3982431.

Table 3. Summary of Regulatory Database Search

CATEGORY	SUMMARY OF INFORMATION (<500m)
Part A(1) and IPPC Authorised Activities	1 effective: 270m south east; and 8 superseded: 270m south east all relating to Immingham CHP
List 1 Dangerous Substances Inventory Sites	1 inactive: 470m south east for Mercury and Cadmium relating to the Phillips 66 Humber Refinery site;
List 2 Dangerous Substance Inventory Sites	1 active: 470m south east for arsenic, chromium, copper, lead, nickel and zinc relating to the Phillips 66 Humber Refinery site;
Licensed Discharge Consents	3 revoked: one 51m south (relating to the Lindsey oil refinery oil interceptor) and two other unspecified trade discharges 470m south; and 1 effective: 50m north east; relating to sewage discharge from Lindsey oil refinery.
Planning Hazardous Substance Consents and Enforcements	1 approved active consents: 130m south relating to VPI Immingham – Consent to store 3050 tonnes of petroleum gas oil.
Dangerous or Hazardous Sites	1 on site current COMAH site (lower tier) relating to VPI Immingham CHP 2 off site current COMAH sites (both upper tier) relating to the Total Lindsey Oil Refinery (100m north east) and Phillips 66 Humber refinery (370m south) 1 off site historic NIHHS site (430m south relating to Conoco Manufacturing Ltd) 1 off site historic COMAH site relating to Humber LPG terminal Ltd (450 m east)
EA Recorded Pollution Incidents List 2	2 recorded: 140m south east – minor impact to air (atmospheric pollutants and effects) 400m south – minor impact to land & air (Oils and Fuels).
EA Recorded Pollution Incidents List 1	1 recorded 400m south of site relating to major persistent and extensive impacts to water (East Halton Beck).
Environment Agency/Natural Resources Wales historic landfill sites	1 on-site historic landfill licence relating to liquid sludge from the Lindsey Oil Refinery.
Environment Agency/Natural Resources Wales licensed waste sites	1 surrendered license 40m north west of the site relating to a biological treatment facility operated by the Lindsey Oil Refinery

CATEGORY	SUMMARY OF INFORMATION (<500m)
Preliminary Unexploded Ordnance Risk Assessment (UXO) by Zetica	Indicative British/Allied UXO Risk: **Negligible** Indicative German UXO Risk: **Low**

No other database entries were identified within 500m of the site boundary. Database listings reviewed included: Historic IPC Authorisations, Red List Discharge Consent Register Part A(2) and Part B Activities and Enforcements, Category 3 or 4 Radioactive Substances Authorisations, Water Industry Referrals, Sites Determined as Contaminated land (Part 2a) or Petrol & fuel sites.

2.5 Sensitive Land Uses

A Groundsure EnviroInsight Report was commissioned to evaluate the presence of environmentally sensitive sites or land uses in the surrounding area which may be affected by activity at the site. In addition, online resources such as the Natural England MAGIC database were also consulted. The results of these searches are summarised below in Table 4.

Table 4. Summary of Sensitive Land Uses (<2000m)

Land use/Site/Designation	Name	Distance
Sites of Special Scientific Interest (SSSI)	Humber Estuary N. Killingholme Haven Pits	1313m NE 1917m N
National Nature Reserves (NNR)	None	N/A
Special Areas of Conservation (SAC)	Humber Estuary	1313m NE
Ramsar Sites	Humber Estuary	1313m NE
Ancient Woodland	None	N/A
Local Nature Reserves (LNR)	None	N/A
World Heritage Site	None	N/A
Areas of Outstanding Natural Beauty (AONB)	None	N/A
National Parks (NP)	None	N/A

Source: Groundsure EnviroInsight Report No. GS-3982430

Rosper Road Pool approximately 600m south east of this site is labelled as a Local Nature reserve on Current Ordnance Survey Mapping although a check on the DEFRA website indicates it is not officially recognised as a Local Nature Reserve.

2.6 Statutory Consultations

No statutory consultations were required in order to undertake the ground investigation. Further consultations may be required before the construction phase.

3. Preliminary Conceptual Site Model

As part of the AECOM report *"VPI Immingham Phase I Geo-environmental Assessment"*, a conceptual site model was developed to identify potential source- pathways- receptor linkages that may exist on the site. These linkages informed the conceptual site model and in turn informed the design of the ground investigation. The conceptual site model from the *"VPI Immingham Phase I Geo-environmental Assessment"* is presented here

3.1 Assessment Framework

The site, in terms of potential land contamination, will be regulated by the local authority (North Lincolnshire County Council) under the Town and Country Planning Act 1990 (as amended), taking account of the National Planning Policy Framework 2012, with the Environment Agency, Natural England and English Heritage acting as statutory consultees.

The 'suitable for use' approach is adopted for the assessment of contaminated land where remedial measures are only undertaken where unacceptable risks to human health or the environment are realised taking into account the use (or proposed use) of the land in question and the environmental setting.

Additional environmental liabilities can arise through provisions contained within statutory legislation including Part 2A of the EPA 1990, the Water Resources Act 1991, the Groundwater Regulations 2009 and the Water Act 2003.

Current best practice recommends that the determination of health hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Statutory Guidance to Part 2A (2012) and CLR11.

The risk assessment process for environmental contaminants is based on a source-pathway-receptor analysis. These terms can be defined as follows:

- Source: hazardous substance that has the potential to cause adverse impacts;
- Pathway: route whereby a hazardous substance may come into contact with the receptor: examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses; and
- Receptor: target that may be affected by contamination: examples include human occupants / users of site, water resources (surface waters or groundwater), or structures.

For a risk to be present there must be a relevant pollutant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway resulting in potentially significant harm.

3.2 Potential Sources of Contamination

Based upon the available information, potential sources of contamination include:

3.2.1 On Site

- Made ground/hard standing present in the car park;
- Stockpiles and mounds (unknown material);
- Historic landfill/liquid Sludge Disposal Area.

3.2.2 Offsite

- Lindsey Crude Oil Refinery (operations and spills/leaks);
- Phillips 66 Humber Refinery;
- Historic Landfills;
- Sand/Clay pits;

- Railway line and railway sidings;
- Crushed demolition material;
- Surrounding agricultural land use

3.3 Contaminants of Concern

Identified potential sources of contamination are summarised in **Table 5**, below.

Table 5 – Summary of Contaminants of Concern

	Source	Contaminants of Concern
Onsite land use	Stockpiles/mounds/made ground	• Stockpiles/mounds are of unknown material, however are likely to include: • Metals e.g. Arsenic, zinc, lead, copper, manganese • Organics e.g. petroleum hydrocarbons
	Historic Landfill	• Metals e.g. Arsenic, Zinc, Lead, Copper, Manganese and Cadmium; • Inorganic Compounds e.g. sulphates, sulphides, cyanides and chlorides;
Offsite land use	Railway line and former railway sidings	• Metals e.g. Arsenic, Zinc, Lead, Copper, Manganese and Cadmium; • Inorganic Compounds e.g. sulphates, sulphides, cyanides and chlorides; • Organic compounds e.g. mineral oils, fuel/lubricating oils, ethylene glycol, • herbicides and • asbestos.
	Sand/Clay Pits	• Metals e.g. arsenic, zinc, lead, copper, manganese and cadmium; • Organics e.g. polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs); • Gases e.g. methane, carbon dioxide, carbon monoxide and hydrogen sulphide.
	Oil refinery operations and VPI power plant operations	• Hydrocarbons e.g. crude oil, motor oils, petrol, diesel, kerosene, lubricants, waxes, bitumen, aviation fuel • Other organics e.g. alcohols, PCBs, MTBE, TAME, solvents, aliphatic and aromatic compounds; • Inorganic compounds e.g. acids, alkalis, cyanides, Sulphur and sulphide; • Metals e.g. aluminium, cobalt, copper, iron, lead, molybdenum, nickel and vanadium; • Others e.g. asbestos
	Crushed demolition material	• Metals e.g. cadmium, mercury, lead and nickel; • Hydrocarbons e.g. polyaromatics, asphaltenes and saturates; • Others e.g. asbestos
	Current VPI Immingham CHP operations, including spills/leaks	• Metals, metalloids and their compounds e.g. aluminium, barium, cobalt and iron; • Polyaromatic hydrocarbons e.g. naphthalene, anthracene and phenanthrene • Other organic compounds e.g. fuel oil, degreasing solvent and PCB’s; • Inorganic compounds e.g. ammonium salts, boron and hydrazine; • Acids and alkalis • Others e.g. asbestos
		•

3.4 Potential Pathways

Based upon the available information, the following are considered potential pathways:

3.4.1 Human Health:

- Direct dermal contact with substances in shallow soil and/or groundwater during potential groundworks;
- Inhalation of substances from the partitioning of vapours from soil and / or shallow groundwater; and,
- Accidental ingestion and/or inhalation of substances in soil/dust and/or shallow groundwater during potential groundworks;

3.4.2 Controlled Waters:

- Vertical migration through unsurfaced areas, vegetated areas and hard-standing (where there are joins / cracks) and drains/pipework into the Made Ground/shallow soil;
- Lateral and vertical migration within the made ground and superficial deposits (Secondary A Aquifer), e.g. leaching from made ground vertically into shallow soil layers, including into deeper groundwater;
- Preferential lateral and vertical migration along routes of underground services, pipelines and associated trenches;
- Lateral overland flow, including via drains, to nearby surface waters;
- Preferential lateral and vertical migration along routes of underground services, pipelines and associated trench;
- Lateral and vertical migration within deeper groundwater in the Chalk bedrock (Principal Aquifer);
- Lateral migration of groundwater into surface water courses and abstraction points;
- Direct contact of substances within shallow groundwater Migration of ground gases and accumulation in confined spaces (e.g. basements, service ducts); and,
- Direct contact with nearby buildings, including Total Lindsey Oil Refinery and Phillips 66.

3.4.3 Ecology:

- Plant uptake and subsequent ingestion by fauna.

3.5 Potential receptors

3.5.1 Human Health:

- On site construction workers;
- Off-site workers e.g. Lindsey Oil refinery; and,
- Nearby residents.

3.5.2 Controlled Waters:

- Surface waters including the River Humber (RAMSAR site) and nearby drains e.g.
- Abstraction points;
- Shallow groundwater within the superficial deposits (Secondary A Aquifer); and,
- Deep groundwater within the chalk bedrock (Principal Aquifer);

3.5.3 Infrastructure:

- Underground services e.g. buried pipes; and,

- Confined spaces within buildings e.g. basements, service ducts;

3.5.4 Ecology:

- Flora and Fauna.

3.6 Preliminary Risk Evaluation

A summary of the risk assessment principles used to evaluate potential pollutant linkages is presented as Appendix B.

3.7 Summary of Potential Pollutant Linkages

A summary of the potential pollutant linkages and the related initial qualitative assessment of risk is summarised in Table 6, below. The risk rankings assume that the current ground and groundwater conditions prevail, prior to any mitigation measures such as further intrusive investigation, quantitative risk assessment or remediation. The risk rankings for each of the pollutant linkages are derived from a combination of:

- The magnitude of the potential consequence (i.e. severity) of the exposure of the receptor to the contaminant; and
- The magnitude of probability (i.e. likelihood) that the pollutant linkage is present or will occur.

Table 6 – Summary of Pollutant Linkages

Source	Pathway	Receptor	Potential severity as defined in Appendix B	Likelihood of Occurrence as defined in Appendix B	Level of Risk as defined in Appendix B	Discussion
On site e.g. Made Ground, Hard Ground and Historic Landfill	Direct dermal contact/ingestion/inhalation;	On-site construction workers Off-site workers Neighbouring residents	Medium	Likely	Moderate	It is likely that future site workers will come into contact with mound/stockpile material, the contents of which are unknown, therefore potential risk is high. There should be appropriate safety and mitigation measures put in place to minimise risk to human health. The nearest residential receptors are located in the village of North Killingholme (1.6km west). Such residents are not anticipated to be at significant risk due to distance from site.
	Inhalation of vapours;		Medium	Likely	Moderate	
	Direct run off into surface waters e.g. River Trent Humber and nearby drains	Controlled water courses e.g. River Humber and groundwater within superficial deposits (secondary A) and bedrock (secondary B).	Medium	Likely	Moderate	As indicated by the EA, there is a historic landfill located in the north western corner of the proposed development site. It is anticipated that any contamination present may have migrated both vertically and laterally into deeper groundwater and surface waters. Hard ground is present on site, indicating that contamination may enter surface waters via overland flow.
	Vertical and lateral migration in made ground/superficial deposits (Secondary A aquifer), including into deeper groundwater (Secondary B aquifer);		Medium	Likely	Moderate	
	Vertical and lateral migration of ground/surface waters along preferential pathways, including to surface waters;		Medium	Likely	Moderate	
	Direct impact to buried infrastructure;	Buried infrastructure .e.g. pipes and underground utilities	Medium	Low	Moderate/Low	The site is within close proximity to the Lindsey Oil Refinery and Phillips 66, meaning that underground services are likely to be present and may be affected during excavation works.
	Plant uptake and subsequent ingestion by fauna;	Flora and fauna	Medium	Likely	Moderate	The River Humber is a designated RAMSAR and Special Protection Area (SPA), therefore any contaminated groundwater uptake is of potential risk to both flora and fauna.
Offsite power plant and oil refinery operations, including spills and leaks	Direct dermal contact/ingestion/inhalation;	On-site construction workers Future on-site excavation and construction workers	Medium	Unlikely	Low	Risk to human health is likely to be low, as remediation procedures, as well as pollutant mitigation measures, are assumed to be enforced by the operators of nearby industry, although this is not known for certain. Therefore, the likelihood of contaminants impacting upon human receptors is low.
	Inhalation of vapours;		Medium	Unlikely	Low	
	Direct run off from on-site resources into surface waters e.g. River Humber and nearby drains;	Controlled water courses e.g. River Humber and deeper groundwater within superficial deposits (secondary A) and bedrock (secondary B);	Severe	Low	Moderate	If contaminated material migrate vertically through the made ground and into the superficial deposits, it is likely that deeper groundwater within the secondary B aquifer and surface waters will also be significantly affected. The likelihood of occurrence is however deemed to be low, as pollutant mitigation measures are assumed to be in place at nearby industrial sites. It is anticipated that groundwater abstraction wells will not be significantly affected by contamination, due to distance from site.
	Vertical and lateral migration in made ground/superficial deposits (Secondary A aquifer) beneath the site;		Severe	Low	Moderate	
	Vertical migration into bedrock (Secondary B aquifer);		Severe	Low	Moderate	
	Vertical and lateral migration of ground/surface waters along preferential pathways;		Medium	Low	Moderate/Low	
Offsite land use inc. sand/clay pits, landfill	Direct dermal contact/ingestion/inhalation;	On-site construction workers Off-site workers Neighbouring residents	Medium	Unlikely	Low	The likelihood of site workers coming into contact with offsite land use contamination is unlikely due to distance from site. It is unlikely that vapours relating to offsite sources will impact human health, assuming correct PPE is worn and safety measures are followed.
	Inhalation of vapours;		Medium	Low	Moderate/Low	
	Direct run off from Off-site resources into surface waters e.g. River Humber and nearby drains;	Controlled water courses e.g. River Humber and groundwater within superficial deposits (secondary A) and bedrock (secondary B)	Medium	Likely	Moderate	Much of the site is covered with hard ground, meaning that any contamination present on site is likely to enter nearby surface waters via overland flow. It is also likely that if exposed during works, contamination may migrate via shallow soils into groundwater and subsequently enter surface waters via lateral migration. .
	Vertical and lateral migration in made ground/superficial deposits (Secondary A aquifer), including into deeper groundwater (Secondary B aquifer) beneath the site;		Medium	Likely	Moderate	
	Vertical and lateral migration of ground/surface waters along preferential pathways;		Medium	Likely	Moderate	
	Direct impact to buried infrastructure onsite;	Buried infrastructure .e.g. pipes and utilities	Medium	Low	Moderate/Low	Contaminants which enter the site from offsite land use impact upon infrastructure if exposed during works.

4. Fieldwork

4.1 Ground investigations

4.1.1 Description of field work

A summary of the exploratory holes were proposed by AECOM and advanced by engineers from Socotec during the site works can be found in Table 7 below;

Table 7. Summary of Exploratory Locations

Type	Quantity	Depth Range (m)	Remarks
Cable Percussion Boring	3	22.34 to 28.66	BH1, BH2 and BH5
Cable Percussion Boring extended by Rotary Core Drilling/Open Hole Drilling	3	28.60 to 34.60	BH3, BH4 and BH6
Dynamic Sampling	8	3.75 to 5.45	WS01 to WS08
Trial Pits/Trenches	13	2.50 to 4.60	TT1 to TT3 and TP1 to TP10

Source: Socotec Factual Report No A805-18, contained in Appendix C

The exploratory hole logs are presented in the Socotec Factual report (Appendix C). Samples taken for geotechnical purposes were collected and transported to Socotec's laboratory in Doncaster for analysis. Samples for environmental testing were collected and transported to Exova Environmental Laboratories, Deeside, for analysis. The laboratory certificates are presented in Appendix D.

4.1.2 In situ testing

Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011) and the SPT hammer energy ratio certificate is included in the Socotec Factual report Appendix C.

4.1.3 Laboratory testing

Soil testing was undertaken on samples recovered from the boreholes. The testing regime was prescribed by AECOM, and the testing was performed by Socotec Ltd and Exova Jones Ltd. All geotechnical testing was UKAS accredited and completed in accordance with current relevant standards, as set out in the Factual Report located in Appendix C. The following geotechnical laboratory tests were undertaken;

- Classification tests, including moisture content, Atterberg limits (INDEX) and particle size distribution (PSD).
- Consolidated (CU) and Unconsolidated (UU) undrained triaxial tests.
- Recompacted California Bearing Ratio (CBR) tests
- Consolidation tests (OED)
- Hydraulic Cell (HC) tests
- Soil chemical testing suite, including pH and sulphate.

Selected soil and groundwater samples were also analysed for a range of chemicals including:

- Volatile Organic Compounds (VOCs).
- Semi Volatile Organic Compounds Including USEPA PAHs (SVOCs).
- Total Petroleum Hydrocarbons- Criteria Working Group (TPH-CWG).
- Heavy Metals;
- pH,

- soil organic matter (soils only),
- asbestos,
- ammoniacal nitrogen, chloride, fluoride, nitrate, sulphide and total sulphate. .

All geochemical tests were where available UKAS and MCERTs accredited. Copies of the tests result and laboratory certificates are presented in Appendix D.

4.2 Ground Investigation Factual Report

The results of the 2018 ground investigation, including exploratory hole logs and geotechnical laboratory testing results, are presented in Socotec's ground investigation factual report entitled "*VPI Immingham Factual Report On Ground Investigation Report No A8015-18*", dated July 2018. A copy of the report can be found in Appendix C.

4.3 Post Ground Investigation

Three rounds of post site work gas and ground water monitoring was undertake by AECOM between 11/05/18 and 7/05/18 the result of which can be found in Appendix E

Fourteen dual-purpose gas / groundwater monitoring wells were installed and subjected to 3 rounds of in-situ monitoring which were undertaken on 11th May 2018, 23rd May 2018 and 1st June 2018. Depth to water was recorded at each location on each visit, while Temperature (°C), Specific Conductivity (µS/cm), Dissolved Oxygen concentration (mg/L) and Oxidation-Reduction Potential (ORP) (mV) were recorded at all wells containing groundwater on the first visit when the single round of groundwater sampling was undertake. Gas flow rates and Oxygen, Carbon dioxide and Methane concentrations were recorded at each location on each monitoring visit. The results of this monitoring is presented in Appendix E

5. Ground Summary

5.1 Summary of Ground Conditions

Published information on geology, including geological maps, is summarised in detail in the VPI Immingham Phase I Geo-environmental Assessment and summarised in Section 2.2 of this report.

The ground conditions in the vicinity of the site comprise:

- Topsoil, overlying;
- Made Ground;
- Superficial deposits (Glacial Till and Glacial Sand and Gravel);
- Chalk of the Burnham Chalk Formation of the Upper Cretaceous period.

The following information is intended to summarise the results of the 2018 ground investigation by SOCOTEC UK Limited and refine the preliminary understanding of the likely ground conditions.

An outline ground model for the site is summarised in Table 8 and discussed in more detail in Sections 5.1.1 to 5.1.3.

Table 8. Outline Ground Model of the Site.

Material	Typical Description	Top of Strata, m bgl	Base of Strata, m bgl	Top of Strata, m OD	Base of Strata, m OD
Made Ground	Sandy gravelly clay	0.0	0.2 to 1.7	6.5 to 4.0	6.3 to 3.2
Glacial Till	Firm to stiff sandy gravelly clay	0.0 to 1.7	21.5 to 27.5	6.0 to 3.5	-16.8 to -21.5
Glacial Sands and Gravels [1]	Medium dense clayey sand and gravel	12.9 to 13.0	15.2 to 16.0	-6.6 to -8.2	-9.3 to - 10.6
Weathered Chalk	Extremely weak to very weak chalk	21.5 to 27.5	26.1 to 30.9	-17.0 to -21.5	-22.5 to -26.6
Unweathered Chalk	Medium Strong to strong chalk	26.1 to 30.9	Unproven	-22.5 to -26.5	Unproven

Note: 1) Glacial Sands and Gravels encountered in three of the six boreholes.

5.1.1 Made Ground

Made Ground is found in most of the exploratory boreholes over a range of depths (approximately 0.2m to 1.7m bgl) across the site. Made Ground is predominately described as a mix of slightly sandy, slightly gravelly, clay and sandy, clayey, gravel in a few boreholes. It contains a mixture of angular to sub-angular gravel of chalk, flint and sandstone. Cobbles are described as subrounded to subangular of concrete and chalk. The layers of different materials suggest both re-worked natural material and placed fill which follow no discernible pattern and so will collectively be assigned as Made Ground.

5.1.2 Superficial Deposits – Glacial Till and Glacial Sands and Gravels

Superficial materials are found to be Glacial Deposits, comprising Glacial Till and Glacial Sands and Gravels. Glacial Till is found consistently in all of the boreholes with approximately 17.0m to 21.0m thickness. It has been described mainly as firm, becoming stiff to very stiff below 0.0m OD, brown, mottled grey, slightly sandy, slightly gravelly, clay. There is a clear trend that shows the material stiffness increasing with depth. Layers of Glacial

Sands and Gravels were encountered in a number of boreholes. The material is described as medium dense, brown, slightly sandy, slightly clayey sand and slightly gravelly, slightly clayey, gravel. A layer up to approximately 1.0m thick was encountered in around 60% of the exploratory holes, between 2.0m and 0.0 m OD. A further layer of several metres thickness, varying from 2.3m to 2.7m thick was recorded in several boreholes at between -6.5m and -10.5m OD. However it was absent in boreholes BH2, BH4 and BH5, being replaced by a clay till deposit. The sand and gravel layers at the site may be lenticular deposits and therefore cannot be guaranteed and the appropriateness of their use in design should be carefully considered.

5.1.3 Bedrock – Burnham Chalk Formation

The boreholes show the bedrock to be chalk of the Burnham Chalk Formation. This confirms what can be seen in the BGS maps of the site. The top the weathered bedrock is found approximately at -17.0m to -21.5m OD. The upper levels of the chalk are frequently described as extremely weak to very weak with clusters of sub-horizontal and sub-vertical fractures. Chalk was mostly recovered as sandy, gravelly, clay. This indicates the upper part of the chalk is highly weathered.

Less weathered chalk was recorded between the depths of -22.5m and -26.5m OD and described as weak to medium strong, cream/white chalk.

6. Geotechnical Parameters

The following assessments and summaries are based on the recent ground investigation data provided by SOCOTEC UK Limited in 2018. Parameters have been derived using a combination of in-situ test results from the Ground Investigation, geotechnical laboratory testing and in the absence of any other data, established engineering correlations.

The 'Typical Derived Values' presented in the tables below are intended to serve as a reference point for establishing characteristic values, which are defined as 'cautious estimate(s) of the value(s) affecting the occurrence of the limit state' (Section 2.4.5.2 (2), BS EN 1997-1:2004). As such, the tabulated derived values are provided as cautious estimates of a parameter, but would need to be reviewed and adjusted according for the limit state being assessed.

Charts summarising the GI results are presented in Appendix F.

6.1 Made Ground

Made Ground material recovered and tested during the recent GI has been classified as either Cohesive Made Ground (predominately soft clay) or Granular Made Ground (predominately gravel). However, the layers of granular material were found less frequently and show no specific pattern so both types of material will collectively be defined as Made Ground. Table 9 presents indicative geotechnical parameters for the Made Ground material. The effective strength parameters defined for the Made Ground can be further assessed, if necessary, on a location specific basis using the GI data.

Table 9. – Typical Material Parameters – Made Ground

Parameter	Type and No. of Tests	Range Encountered	Typical Derived Value	Remarks
Unit Weight (kN/m^3)	CBR (3)	18.8 - 19.8 (mean 19.33)	19	Derived value based on data obtained as part of recompacted CBR testing and typical published values for materials identified (BS8002:2015, Bond 2014 and Barnes 2000).
Moisture Content (%)	INDX (5)	20 - 27 (mean 22.6)	-	Data obtained primarily from Atterberg limit tests.
Liquid Limit (%)	INDX (5)	44 - 54 (mean 47.2)	-	Data obtained from Atterberg limit tests.
Plasticity Index (%)	INDX (5)	21 - 29 (mean 25.2)	28	Cautious estimate of derived value based on data obtained from Atterberg limit tests.
c_u (kPa)	HV (20)	70 - 120 (mean 110.5)	30	Cautious estimate based on borehole descriptions and guidance in BS5390:2015. Hand Shear Vane tests tend to over-estimate C_u values and have therefore only been used as an approximate guide.
E_s (MPa)	HV (20) (correlated from HV)	6MPa to 15MPa	6	E_s = (200 to 500) x C_u (Bowles. 1997).
c' (kPa)	-	0	0	No direct test data available. Cautious estimate of derived value recommended.
Phi' (degrees)	INDX (5) (correlated)	24 - 26	25 (critical state)	Cautious estimate of critical state derived value based on correlations relating critical state angle of friction and plasticity index (assuming a mean PI value of 25) from Table 2 of BS 8002:2015. Location-specific interpretation to be undertaken for design due to variable composition.

6.2 Glacial Till

Glacial Till was the predominant material found in the boreholes with sporadic and of variable thickness layers of Glacial Sands and Gravels. The Glacial Sands and Gravels layers were identified in around half of the exploratory holes, at levels between 2.0m to 0.0 m OD and -6.5m to -10.5m OD, approximately. As a conservative assumption, it is not recommended that these layers should be modelled separately. Further assessment can be done on a location specific basis if it is later considered necessary and beneficial to assign engineering parameters to the Glacial Sand and Gravel layers.

The Glacial Till was found typically as clay with secondary constituents in varying proportions of sand and gravel. The colour is mostly brown with grey mottling. The stiffness and strength of the material increases with depth. Indicative geotechnical parameters are shown in Table 10.

Table 10 Typical Material Parameters – Glacial Till

Parameter	Type and No. of Tests	Range Encountered/ Derived	Typical Derived Value	Remarks
Unit Weight (kN/m^3)	CBR (7) + UU(14) + CU(6) + OED (8) + HC (2)	19 – 23.5 (mean 20.9)	20	Derived value based on data obtained as part of recompacted CBR testing and typical published values for materials identified (BS8002:2015, Bond 2014 and Barnes 2000).
Moisture Content (%)	INDX (71) + UU(14) + CU(6) + OED(8) + HC(2) + CBR(20)	4.9 - 28 (mean 18.9)	-	Data obtained primarily from Atterberg limit tests.
Liquid Limit (%)	INDX (34)	23 - 50 (mean 36.8)	-	Data obtained from Atterberg limit tests.
Plasticity Index (%)	INDX (34)	9 - 28 (mean 19.4)	Above 0.0m OD = 25 Below 0.0m OD = 18	Cautious estimate of derived value based on data obtained from Atterberg limit tests. Refer to Appendix F Figure A.7.
SPT-N	SPT (143)	4 - 57 (mean 28.13)	Above 0.0m OD = 13.5 Below 0.0m OD = 13.5 + 1.75L	Where L is depth below 0.0m OD.
C_v	CU (6) + OED(8)	0.61 to 5.6 (mean 2.1)	2.1	Typical values from OED + CU tests at δ_{vo} + 150kPa pressure. C_v of 17 in BH1 omitted from calculations.
M_v	CU (6) + OED(8)	0.02 to 0.67 (mean 0.22)	0.1	Range of values from CU + OED tests at δ_{vo} + 150kPa pressure. Results from OED tests are considered to give a more accurate representation of M_v values than CU tests, therefore more weight has been given to the OED results when creating typical values. Results indicate that the material has a very low to medium compressibility index (Tomlinson 2001)
c_u (kPa)	SPT (143) + HV(23)	20 - 285 (mean 137.2)	Above 0.0m OD = 50 Below 0.0m OD = 50 + 9.5L	Cautious estimate of derived value based on a correlation of c_u = 4 x SPT-N (Stroud, 1974). Where L is depth below 0.0m OD. Hand Shear Vane tests tend to over-estimate C_u values and have therefore only been used as an approximate guide.

Parameter	Type and No. of Tests	Range Encountered/ Derived	Typical Derived Value	Remarks
E_s (MPa)	SPT (143) (correlated)	3.6 - 45 (mean 36.8)	Above 0.0m OD = 12 Below 0.0m OD = 12 + 1.5L	Cautious estimate of derived value based on E_s/N = 0.9 MPa for cohesive soils.
c' (kPa)	CU(6)	2.2 – 15.9	2	Cautious assumed values taken from CU tests.
Phi' (degrees)	CU(6)	27 to 31	Above 0.0m OD = 27 Below 0.0m OD = 29	Cautious assumed values taken from CU tests

6.3 Burnham Chalk Formation

The chalk formation encountered in the boreholes is mostly described as extremely weak to weak with closely spaced fractures (recovered as gravelly clay) overlying medium to medium strong layer of chalk. The colour is identified as white and/or cream with occasional grey or black staining.

Table 11 presents a published range of values for chalk in the literature (CIRIA 574, CIRIA Project Reports 11 and 86). As part of the 2018 GI, six (6.No) SPT tests were undertaken within the Burnham Chalk Formation, one of these is located within the unweathered material. Without geotechnical laboratory testing information available for the chalk formation, it is not possible to provide typical derived values. Should the proposed foundations terminate within, or close to, the Burnham Chalk Formation, further geotechnical information will be required at the geotechnical design stage.

Table 11 Typical Material Parameters – Chalk

Parameter	Range Encountered/ Derived	Typical Derived Value (weathered chalk)	Typical Derived Value (unweathered chalk)	Remarks
Unit Weight (kN/m^3)	13 - 24	19(1)	20 (2)	No laboratory testing information available from ground investigation. (1) Correlates to a low to medium density, weak chalk (Table 3.7 Lord et al 2002) (2) Correlates to a high density moderately weak chalk.
Moisture Content (%)	4 – 40	Unknown	Unknown	No laboratory testing information available from ground investigation. Typical Range of values taken from CIRIA Guide C574.
Liquid Limit (%)	18 – 53	Unknown	Unknown	
Plasticity Index (%)	4 – 30	Unknown	Unknown	
SPT (N)	44 – 50 (6.No SPT)	50	50	
Point load Index (MPa)	0.01 – 1.15	Unknown	Unknown	
q_u (MPa)	0.7 – 40	Unknown	Unknown	
E_s (GPa)	1 – 30	Unknown	Unknown	
c' (kPa)	0 – 320	Unknown	Unknown	
Phi' (degrees) (Peak)	29 - 42	Unknown	Unknown	
UCS (MPa)	0.7 – 40	Unknown	Unknown	

6.4 Groundwater Strikes

Groundwater strikes encountered during the investigation of 2018 are summarised in Table 12 and were recorded at a range of depths (1.0m to 28.6m bgl) throughout the site. All of the strikes were found in the Glacial Till deposits with the exception of TP9, which was recorded in Made Ground at 0.7m bgl. Refer to Table 10 and Appendix C for summary of all groundwater strikes. It is considered likely that multiple water tables are contained within the Glacial Deposits.

Table 12 Recorded Groundwater Levels (04.2018)

Borehole No.	Borehole Ground Level (m OD)	Groundwater Strike Depth (m bgl)	Groundwater level after 20 mins (m bgl)	Geology
BH1	6.36	3.8	2.3	Glacial Till
		8.5	6.3	Glacial Till
		13.5	9	Glacial Sands and Gravels
		21	19.7	Glacial Till
BH2	5.43	1.8	1.5	Glacial Till
		4.2	1.7	Glacial Till
		14.1	10	Glacial Till
BH3	5.43	3	1.2	Glacial Till
		7.1	4.2	Glacial Till
		13.3	6.1	Glacial Sands and Gravels
		26.8	8.7	Chalk
BH4	4.19	3.2	1	Glacial Till
		7.4	2.1	Glacial Till
		12	7	Glacial Till
		13.4	4.2	Glacial Till
		17.8	15.1	Glacial Till
		24	9.6	Glacial Till
BH5	4.65	12.4	12.1	Glacial Till
		17.6	16.7	Glacial Till
BH6	4.71	4.65	2.5	Glacial Till

		11.7	3.1	Glacial Till
		18.6	16.6	Glacial Till
		21.5	16.1	Chalk
WS1	6.49	4.2	-	Glacial Sands and Gravels
WS4	5.1	3	-	Glacial Sands and Gravels
WS6	5.69	4	-	Glacial Sands and Gravels
WS7	5.79	5	-	Glacial Sands and Gravels
TP5	4.31	1.2	-	Glacial Till
TP6	5.43	1.9	-	Glacial Till
TP7	5.29	1.1	-	Glacial Till
TP9	5.71	0.7	-	Granular Made Ground
TP10	4.7	1	-	Glacial Till
TT1	6.44	1.5	-	Glacial Till

Groundwater strikes were recorded at a range of depths (1m to 28.6m bgl) throughout the site during the ground investigation. The majority of the strikes were found in the Glacial Till with a few strikes recorded in the Glacial Sands and Gravels and Chalk. In many cases, the groundwater is under sub-artesian pressures and semi-confined by less permeable clay layers. Upon release of these pressures, the recorded water strike level rises quite rapidly. Refer to Table 10 and Appendix C for summary of all groundwater strikes.

6.5 Groundwater monitoring

Following the 2018 GI, 3 rounds of ground water monitoring were undertaken by AECOM, a summary of these results can be found in Table 13 below.

Table 13 Groundwater Monitoring Results Summary (04.2018)

Hole ID	GL m OD	Range of groundwater levels m bgl	Range of ground water levels m OD	Response zone (m bgl)	Strata
BH01	6.36	3.70 -3.97	2.39 - 2.65	12.50-15.00	Glacial Deposits
BH02	5.43	2.66 - 2.87	2.56 - 2.77	14.00-15.30	Glacial Deposits
BH03	5.43	2.57 - 2.75	2.68 - 2.86	26.60-28.60	Burnham Chalk
BH04	4.19	1.31 - 1.56	2.63 - 2.88	28.60-34.60	Burnham Chalk
BH05	4.65	1.86 - 2.04	2.61 - 2.78	17.50-18.50	Glacial Deposits
BH06	4.71	2.19 - 2.33	2.38 - 2.51	25.50-34.50	Burnham Chalk
WS01	6.49	2.08 - 2.16	4.33 - 4.40	1.00-1.40	Made Ground

WS02	5.46	1.32 - 1.36	4.09 - 4.14	0.70-1.20	Made Ground
WS03	5.52	1.40 - 1.52	3.99 - 4.12	2.50-3.50	Glacial Deposits
WS04	5.1	0.96 - 0.99	4.11 - 4.13	1.30-2.30	Made Ground/Glacial Deposits
WS05	4.7	0.98 - 1.00	3.67 - 3.72	3.20-4.20	Glacial Deposits
WS06	5.69	1.59 - 1.64	4.05 - 4.10	3.10-3.70	Glacial Deposits
WS07	5.79	1.83 - 1.86	3.92 - 3.95	3.00-3.50	Glacial Deposits
WS08	4.53	3.33 - 3.86	0.67 - 1.19	3.60-4.10	Glacial Deposits

As shown in Table 13, the monitored groundwater levels range from 4.33m OD to 0.67m OD. Many of the recorded levels are shown above the selected response zones. This can indicate the groundwater in the more porous strata is under sub-artesian pressures and is confined by overlying less permeable strata, as theorised in Section 6.4.

6.6 Concrete Aggressivity

The concrete aggressivity testing was undertaken only on samples from superficial layers (6.No samples from Glacial Deposits and 5.No samples in Made Ground). Based on the limited data available, the following Design Sulphate and ACEC design classes for concrete in aggressive ground are classified in Table 14. The below results are based on brownfield conditions and are in accordance with the BRE Special Digest 1 (Concrete in Aggressive Ground). Three of the four samples taken within the Glacial Till show high value of oxdisable sulphides (>0.3%), this could suggest pyritic ground. Based on this, the classification results shown in Table 14 for the disturbed ground, assume that pyrite is present.

Table 14 Summary of Preliminary Concrete Aggressivity Classification

Stratum	Classification (undisturbed ground, eg. for buried piles)	Classification (disturbed ground, eg. for pile cap)
Made Ground	DS-2, AC-2	DS-2, AC-2
Glacial Deposits	DS-1, AC-1	DS-3, AC-3

Sulfate classes (DS) and aggressivity to concrete classes (AC) range from DS-1/AC-1 to DS-5/AC-5, with higher value classes being assigned to the more adverse ground conditions.

7. Contamination Assessment

7.1 Sample Analysis

Environmental sampling was conducted on a total of 26 soil samples and 7 groundwater samples taken during the Ground Investigation works. The full results of this testing can be found in the Ground Investigation Factual Report presented in Appendix G, but a summary of the soil and groundwater testing scheduled following the ground investigation is summarised in Tables 15 and 16.

Table 15. Summary of Geo-Environmental Soil Testing

Suite	Test Determinants	No. of Tests	Locations
CLEA Metals	As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Se, V, Zn, Cr VI, Cr III	26	BH01-BH06, WS01-06, TP01-TP02, TP04-TP10, TT01-TT03
VOC+TICs	VOC target list (inc BTEX/MTBE) + TICs	10	BH01, BH02, BH05, TP01, TP02, TP06, WS01-WS03, WS05
SVOC+TICs	SVOC target list including PAHs, phenol, chlorinated phenols and phthalates (100ug/kg) plus TICs	10	BH01, BH02, BH05, TP01, TP02, TP06, WS01-WS03, WS05
TPH - CWG	TPH CWG (Aliphatics C5-6,>6-8,>8-10,>10-12,>12-16,>16-21,>21-35) (Aromatics >C5-7,>7-8,>8-10,>10-12,>12-16,>16-21,>21-35) inc BTEX/MTBE	10	BH01, BH02, BH05, TP01, TP02, TP06, WS01-WS03, WS05
Inorganics	Fluoride (soluble), Nitrate (soluble), Sulphide, Total Sulphate	10	BH01, BH02, BH05, TP01, TP02, TP06, WS01-WS03, WS05
Chloride		7	BH01, BH02, BH05, WS01-WS03, WS05
pH		26	BH01-BH06, WS01-06, TP01-TP02, TP04-TP10, TT01-TT03
Soil Organic Matter (SOM)		24	BH01-BH06, WS01-06, TP04-TP10, TT01-TT03
Ammoniacal Nitrogen		25	BH01-BH03, BH05-BH06, WS01-06, TP01-TP02, TP04-TP10, TT01-TT03
Asbestos	Fibre screen/ asbestos ID (as described in HSE document HSG 248)	26	BH01-BH06, WS01-06, TP01-TP02, TP04-TP10, TT01-TT03

Table 16. Summary of Geo-Environmental Groundwater Testing

Suite	Test Determinants	No. of Tests	Locations
VOC + TICs	VOC target list including BTEX/MTBE + TICs by GC-MS	4	WS03-WS06
SVOC	SVOC target list including PAHs, phenol and chlorinated phenols by GC-MS	4	WS03-WS06
TPH-CWG	TPH CWG (Aliphatics C5-6,>6-8,>8-10,>10-12,>12-16,>16-21,>21-35) (aromatics >C5-7,>7-8,>8-10,>10-12,>12-16,>16-21,>21-35) inc BTEX/MTBE	7	BH01-BH03, WS03-WS06
CLEA full metals + Fe(II)	CLEA Metals Full As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, V, Be, Ba, B, Cr VI, Cr III Fe(II)	7	BH01-BH03, WS03-WS06
Dissolved Organic Carbon (DOC)		7	BH01-BH03, WS03-WS06

Suite	Test Determinants	No. of Tests	Locations
Inorganics	pH, Ammoniacal Nitrogen as N, Total Alkalinity as CaCO3, Chloride, Nitrate as N, Ortho-Phosphate as P, Sulphate	7	BH01-BH03, WS03-WS06
Total Suspended Solids (TSS)		7	BH01-BH03, WS03-WS06

7.1.1 Observations of contamination

Visual and olfactory evidence of contamination was encountered at shallow depth in the made ground at 9 locations during the ground investigation. Headspace analysis for the presence of Volatile Organic Compounds (VOCs) was undertaken on samples taken from these locations and Photo Ionisation Detector (PID) readings recorded. These observations, along with the PID readings, are summarised in Table 17. These observations albeit not quantitative were used to select samples sent for laboratory analysis.

Table 17. Summary of Observations of Contamination

Location	Depth (m bgl)	Description	PID Reading (ppm)
BH01	0.45-0.7	Made Ground, oily smell, black staining, wet	3.3
BH02	0.6-1.0	Made Ground, oily smell, black staining	0.9
WS01	0.5-1.2	Made Ground, oily smell	1.3
WS02	0.0-0.5	Made Ground, oily smell, black staining	0.8
WS03	0.0-1.2	Made Ground, oily smell, black staining	0.5
WS05	0.0-1.2	Made Ground, oily smell, black staining	0.1
TP01	0.7-0.9	Made Ground, oily smell, black staining	4.4
TP02	0.3-0.5	Made Ground, oily smell, black staining	42.4
TP06	0.4-0.6	Made Ground, oily smell, black staining	0.3

7.2 Stage 2 Risk Assessment

7.2.1 Human Health Risk Assessment Methodology

This assessment has been based on a general industrial or commercial future use of the site and neighbouring sites.

The assessment considers chronic risks only and does not assess acute risks to construction / maintenance workers during intrusive works.

Where the conceptual site model identifies one or more complete pollutant linkage(s) with respect to human health it is often necessary to clarify the risk posed by that pollutant linkage by comparison of reported concentrations with guideline values that represent acceptable concentrations. This includes assessing risks to human health at a generic level (termed ‘Generic Quantitative Risk Assessment’ (GQRA) or ‘Stage 2’ in the Environment Agency’s Model Procedures for the Management of Land Contamination, Contaminated Land Report 11, 2004 (known as CLR11)).

The assessment of cumulative risk from multiple substances is not required at GQRA level, with the exception of TPH. In accordance with Environment Agency science report P5-080/TR3[2], a hazard index (HI) is calculated for each individual sample based on the summation of the hazard quotient (HQ) for each TPH fraction.

Stage 2 Generic Assessment Criteria (GAC) for soils have been calculated using the reported Total Organic Carbon (TOC) concentration of samples collected and analysed as part of the intrusive investigation.

Based on the exploratory records, the most appropriate soil type for the Made Ground and the superficial deposits was considered to be the worse-case 'SAND' scenario, as defined by the Environment Agency's standard default soil descriptions.

It should be noted that Stage 2 assessments tend to be relatively conservative and are therefore suitable for initial screening of the potential chronic long term risks to human health at a site only. Full details of the physical and chemical parameters used in the derivation of the GAC can be made available upon request.

7.2.1.1 Asbestos

A total of 25 samples collected were analysed for asbestos across the site. Six samples reported asbestos fibres (chrysotile) were present in the made ground, however the volume of asbestos detected was reported as being less than 0.1% mass by weight in each case. Further Gravimetric Quantification testing of the samples was conducted and a summary of the asbestos quantification is presented in Table 18. Laboratory certificates are presented in Appendix D.

Table 18. Results of asbestos analysis

Location	Depth (m bgl)	Asbestos type	Present as	Quantity (w/w%)
BH01	0.45-0.70	Chrysotile	Fibre bundles	<0.001%
BH02	0.6-1.0	Chrysotile	Fibre bundles	<0.001%
WS01	1.0-1.25	Chrysotile	Fibre bundles	<0.001%
TP01	0.7-0.9	Chrysotile	Fibre bundles	<0.001%
TP02	0.3-0.5	Chrysotile	Fibre bundles	<0.001%
TP06	0.4-0.6	Chrysotile	Fibre bundles	<0.001%

The presence of asbestos fibres presents a potential acute occupational health risk to any groundworks which may be undertaken on the site and should be considered by the contractor as part of any future intended works and any off-site disposal of soils.

7.2.1.2 Human Health Risk Assessment Results & Discussion

A comparison of the results of laboratory testing with the Stage 2 GAC selected for this site indicate that there are no exceedances of the chosen screening values in either soil or groundwater samples including those where visual olfactory impact was encountered . As such, no further assessment of chronic human health risks from soils are required. The full contamination assessment can be found in Appendix G.

7.2.2 Controlled Waters Risk Assessment Methodology

AECOM has a prescribed methodology for assessing risks to controlled waters at a generic level termed 'generic quantitative risk assessment' (GQRA) or 'Stage 2' in CLR11[3].

For sites in England and Wales where the conceptual site model has identified a potentially complete contaminant linkage to controlled waters, the first step is to define a suitable water target value (WTV) for the identified point of compliance upon which the risk assessment can be based. For groundwater compliance points which may support potable abstraction, the UK Drinking Water Standard (DWS) is used in England and Wales

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[2] *The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soil, Report P5-080/TR3*. Bristol: Environment Agency (2005).

[3] Environment Agency (2004) Model Procedures for the Management of Land Contamination, Contaminated Land Report 11. September 2004.

whilst for surface water compliance points or non-potable aquifer units, an Environmental Quality Standard (EQS) is adopted. EQS coastal has been adopted for this site due to the sites proximity to the Humber Estuary.

The following Controlled Waters receptors have been considered in the following assessment:

- Superficial deposits underlying the site are classified as a Secondary A Aquifer;
- The Burnham Chalk Formation limestone bedrock underlying the site is classified as a Principal Aquifer; and
- The Humber estuary.

7.2.2.1 Controlled Waters Risk Assessment Results & Discussion

A comparison of the results of laboratory testing with the Stage 2 GAC selected for this site indicate that there are a number of exceedances of the chosen screening values. These exceedances are detailed in Table 19 below; The full contamination assessment can be found Appendix G

Table 19. Exceedance of Stage 2 GAC for Controlled Waters: Groundwater

Parameter	Location	Max Concentration (µg/l)	Exceedance of DWS	Exceedance of EQS
Selenium	BH03	16	X	
Zinc	BH01, BH03, WS05	12		X
Sulphate	WS03-WS06	983,900		X
Chloride	WS03-WS05	1,280,000		X

Table 19 shows that analysis of groundwater beneath the site indicates that only Selenium exceeds the DWS, while zinc, sulphates and chloride exceed the Coastal EQS. The exceedance of the DWS for Selenium is marginal (a magnitude of 1.6) and there are no potable extractions in the vicinity of the site, while the EQS exceedances are not replicated in surface waters within the hydrological catchment according to published Environment Agency monitoring data.

While unacceptable risk cannot be demonstrated to controlled waters at this time, the possibility of pathways for contaminants from soils to groundwater or surface water being created by the development (e.g. along services or foundations) or during the construction phase must be considered as part of the scheme design.

7.2.3 Ground Gas Risk Assessment

The ground gas assessment is based on a three ground gas monitoring events undertaken during May and June 2018. Details of the ground gas monitoring is provided in Appendix E.

The results of the gas monitoring are summarised in Table 20 and indicate that:

- Methane was recorded at levels <0.1 – 0.7% Vol. which is below the lower explosive limit.
- Carbon dioxide was recorded at levels <0.1 – 3.9% Vol.
- Oxygen was recorded at levels between 14.4– 20.7% Vol;
- Gas flow rates were recorded between -17.0 and 7.3l/hr;

Potential risks posed by the identified ground gas regime have been considered using the methodology outlined in BS 8485:2015.

A summary of the Gas monitoring is given in Table 20 which includes the Characteristic Situation per borehole. The published guidance including BS8485 and CIRIA C665 indicates that there is a six-fold scale of Characteristic Situations for the potential emission of ground gas, mainly methane and carbon dioxide, which are related to the setting of the site and the gassing potential of the ground. The Characteristic Situation is determined from data on monitored gas concentrations and flow rates. Characteristic Situation 1 is essentially very low risk typical of natural soils with low gassing potential whereas Characteristic Situation 6 is very high risk typical of young or recent active landfills. In order to calculate the worst case characteristic situation the maximum carbon dioxide concentration of 3.9% and a worst case flow rate, assuming negatives value have the potential to be positive, of 17l/hr were used to calculate the Gas Screening Value. This is therefore calculated as 0.29. Furthermore concentrations of Carbon Dioxide and Methane are below 5% and 1% respectively which, as defined by BS8485:2015, means the site is classified as Characteristic Situation (CS) 2.

In the six-fold scale CS2 denotes a low risk from ground gas.

The Characteristic Situation is then used to define the level of protection from ground gas to be built into the development, taking account of the "Type" of building development which relates to the sensitivity of the development and its use. The range of protection measures are rated according to a scoring (points) scale in BS8485, thus the designer can assemble a range of measures which together reach the required aggregate score for the Characteristic Situation and building type being dealt with. It is considered that in accordance with the development proposals, the majority of the proposed generation plant and buildings on site would fall into a "Type D" industrial style buildings which for a CS2, where the made ground is left in place, will require 1.5 points of gas protection. This is a relatively low level of protection consistent with the CS rating. However any smaller ancillary buildings will be classified as "Type C" which will require a higher level of protection which AECOM considers would be 2.5 points of gas protection in the event that the made ground is left in place.

However the highest concentrations of Carbon Dioxide and flow were detected in shallow Made Ground. Should Made Ground be removed as part of site preparation the Gas screening value, which would be defined by the gassing potential of the natural strata, would be 0.0584 which would classify the site as CS 1, very low risk, where no gas protection measures are required.

Table 20 Summary of ground Gas Monitoring

Exploratory Hole	Stratum	Date	Barometric Pressure (mb)	Peak Flow rate (l/h)	Steady Flow	Peak CO2 (% vol)	Peak CH4 (% vol)	GSV	Characteristic Situation CO2	GSV (l/hr)	Characteristic Situation CH4	Min O2 (% vol)
WS01	Made Ground	11/05/2018	1011.0	0.0	0.0	1.0	0.7	0	1	0	1	19.6
		23/05/2018	1025.0	0.0	0.0	0.1	0.1	0	1	0	1	20.3
		07/06/2018	1018.0	0.0	0.0	0.5	0.2	0	1	0	1	20.2
WS02	Made Ground	11/05/2018	1012.0	0.0	0.0	0.4	0.1	0	1	0	1	20.1
		23/05/2018	1026.0	-17.0	0.0	3.9	0.1	-0.663	1	-0.017	1	14.4
		07/06/2018	1018.0	0.0	0.0	1.3	0.1	0	1	0	1	19.4
WS03	Glacial Deposits	11/05/2018	1012.0	0.0	0.0	0.1	0.1	0	1	0	1	20.5
		23/05/2018	1025.0	7.3	0.0	0.3	0.2	0.0219	1	0.0146	1	20.3
		07/06/2018	1018.0	5.4	0.0	0.3	0.3	0.0162	1	0.0162	1	20.4
WS04	Glacial Deposits	11/05/2018	1012.0	0.0	0.0	0.2	0.2	0	1	0	1	20.2
		23/05/2018	1026.0	0.0	0.0	0.1	0.1	0	1	0	1	20.3
		07/06/2018	1018.0	0.0	0.0	0.1	0.1	0	1	0	1	20.6
WS05	Glacial Deposits	11/05/2018	1012.0	0.0	0.0	0.0	0.0	0	1	0	1	20.7
		23/05/2018	1026.0	0.0	0.0	0.1	0.1	0	1	0	1	20.3
		07/06/2018	0.0	0.0	0.0	0.0	0.0	0	1	0	1	20.4
WS06	Glacial Deposits	11/05/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.6
		23/05/2018	1025.0	0.0	0.0	0.2	0.1	0	1	0	1	20.3
		07/06/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.7
WS07	Glacial Deposits	11/05/2018	1016.0	0.4	0.2	0.4	0.2	0.0016	1	0.0008	1	20.6
		23/05/2018	1025.0	0.0	0.0	0.4	0.1	0	1	0	1	20.2
		07/06/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.7
WS08	Glacial	11/05/2018	1017.0	4.8	0.0	0.7	0.5	0.0336	1	0.024	1	20.4

	Deposits	23/05/2018	1026.0	4.8	0.0	0.2	0.0	0.0096	1	0	1	20.4
		07/06/2018	1016.0	1.3	0.0	0.5	0.0	0.0065	1	0	1	20.7
BH01	Glacial Deposits	11/05/2018	1012.0	0.0	0.0	0.4	0.2	0	1	0	1	20.1
		23/05/2018	1026.0	5.3	0.0	0.6	0.4	0.0318	1	0.0212	1	19.8
		07/06/2018	1018.0	-1.0	0.0	0.7	0.5	-0.007	1	-0.005	1	19.9
BH02	Glacial Deposits	11/05/2018	1012.0	0.0	0.0	0.2	0.2	0	1	0	1	20.5
		23/05/2018	1025.0	0.0	0.0	0.1	0.1	0	1	0	1	20.4
		07/06/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.6
BH03	Chalk	11/05/2018	No readings possible									
		23/05/2018	1026.0	0.0	0.0	0.8	0.1	0	1	0	1	20.3
		07/06/2018	1017.0	6.0	0.0	0.1	0.1	0.006	1	0.006	1	20.4
BH04	Chalk	11/05/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.7
		23/05/2018	1025.0	0.0	0.0	0.1	0.1	0	1	0	1	20.3
		07/06/2018	1016.0	0.0	0.0	0.1	0.0	0	1	0	1	20.7
BH05	Glacial Deposits	11/05/2018	1017.0	0.0	0.0	0.4	0.1	0	1	0	1	20.1
		23/05/2018	1026.0	0.0	0.0	0.2	0.1	0	1	0	1	20.3
		07/06/2018	1016.0	0.0	0.0	0.0	0.0	0	1	0	1	20.7
BH06	Chalk	11/05/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.6
		23/05/2018	1025.0	0.0	0.0	0.1	0.1	0	1	0	1	20.4
		07/06/2018	1017.0	0.0	0.0	0.1	0.1	0	1	0	1	20.7
Worst case CS			1026.0	17.0	0.2	3.9	0.7	0.663	2	0.119	0.11271	20.7

7.2.3.1 Discussion of Risks to Ecological Receptors

The Statutory Guidance which accompanies Part 2A of the Environmental Protection Act 1990 defines ecological receptors as any ecological system, or living organism forming part of such a system, within a location which is:

- A site of special scientific interest (under section 28 of the Wildlife and Countryside Act 1981)
- A national nature reserve (under s.35 of the 1981 Act)
- A marine nature reserve (under s.36 of the 1981 Act)
- An area of special protection for birds (under s.3 of the 1981 Act)
- A “European site” within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2010
- Any habitat or site afforded policy protection under section 176 of the National Planning Policy Framework 2018 (NPPF) on nature conservation (i.e. candidate Special Areas of Conservation, potential Special Protection Areas and listed Ramsar sites); or
- Any nature reserve established under section 21 of the National Parks and Access to the Countryside Act 1949.

Any risk assessment must consider whether significant harm is being caused or a significant possibility of significant harm exists to any given ecological receptor. Harm in this context could be defined as;

- Harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or
- Harm which significantly affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location.
- In the case of “European Sites”, harm can exist where the sites designation could be affected by the presence of a contaminant linkage.

A significant possibility of significant harm exists where significant harm is more likely than not to exist for any given linkage or where there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration.

In the case of this site, there are a number of potentially sensitive ecological sites in the wider area, but the closest (the Humber Estuary which is a SSSI, SPA and Ramsar site) is 1.3km away and so unlikely to be affected by pollutants present on the site. Routine monitoring of the ecological receptors in the Humber Estuary does not suggest that there is currently an unacceptable risk to those receptors.

7.3 Revised Conceptual Site Model

7.3.1 Introduction

A refined conceptual site model (CSM) has been developed on the basis of the desk study and the findings of the ground investigation and contamination assessment.

To assess the potential geo-environmental impacts associated with chemicals of potential concern in the section, the conceptual model has been revised using the source pathway receptor approach, promoted by DEFRA and the Environment Agency. For there to be an identifiable risk, not only must there be contaminants present across the section (source) there must also be a receptor and a pathway which allows the source to impact on the receptor.

7.3.2 Risk Assessment Framework

The site, in terms of potential land contamination, will be regulated by the local authority (North Lincolnshire County Council) under the Town and Country Planning Act 1990 (as amended), taking account of the National Planning Policy Framework 2012, with the Environment Agency, Natural England and English Heritage acting as statutory consultees.

The 'suitable for use' approach is adopted for the assessment of contaminated land where remedial measures are only undertaken where unacceptable risks to human health or the environment are realised taking into account the use (or proposed use) of the land in question and the environmental setting.

Additional environmental liabilities can arise through provisions contained within statutory legislation including Part 2A of the EPA 1990, the Water Resources Act 1991, the Groundwater Regulations 2009 and the Water Act 2003.

Current best practice recommends that the determination of health hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Statutory Guidance to Part 2A (2012) and CLR11.

The risk assessment process for environmental contaminants is based on a source-pathway-receptor analysis. These terms can be defined as follows:

- Source: hazardous substance that has the potential to cause adverse impacts;
- Pathway: route whereby a hazardous substance may come into contact with the receptor: examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses; and
- Receptor: target that may be affected by contamination: examples include human occupants / users of site, water resources (surface waters or groundwater), or structures.

For a risk to be present there must be a relevant pollutant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway resulting in potentially significant harm.

7.3.3 Pollutant Linkages

The Potential Pollutant Linkages identified in the previous AECOM report "*VPI Immingham Phase I Geo-environmental Assessment* have been revised following the completion of the ground investigation and the residual linkages are presented below in Table 21. Linkages previously assessed to be 'Low' risk in the Phase 1 Desk Study document have been removed from the table:

Table 21: Revised Conceptual Site Model

Source	Pathway	Receptor	Preliminary Level of Risk	Discussion & Mitigation	Residual Level of Risk
On site e.g. Made Ground, Hard Ground and Historic Landfill	Direct dermal contact/ingestion/inhalation;	On-site construction workers Off-site workers Neighbouring residents Future site workers	Moderate	A Stage 2 Risk Assessment of the results of the ground investigation has not deemed that the soils pose an unacceptable risk to human health for the proposed end use. Low levels of asbestos fibres were found to be present in made ground at several locations on the site, but these concentrations are not sufficient to present a risk to receptors on adjacent sites during construction or to the proposed development which will be covered by hardstanding or structures. Visual and Olfactory evidence of impacted soil was encountered in several locations therefore during construction the use of correct PPE and an appropriate Construction Environmental Management Plan (CEMP) will protect construction workers from exposure pathways created by excavations and stockpiled material and make sure that migration of contaminants to more sensitive adjacent land uses is controlled.	Low
	Inhalation of vapours;		Moderate		Low
	Inhalation of asbestos fibres				
	Inhalation of ground gas, i.e. methane and carbon dioxide		Moderate	A preliminary assessment of measured gas concentrations and flow rates in accordance with BS8485:20015 has determined that the overall 'Characteristic Gas Classification' for the site is Category 2 ,It is considered that in accordance the majority of the proposed power generation plant and buildings on site would fall into a Type D industrial style buildings which for a CS2 will require 1.5 points of gas protection however any smaller ancillary buildings will be classified as type C which will require 2.5 points of gas protection. However if Made Ground is removed as part of the pre construction works the site would classify as CS1 where no protection measures are required. The Construction Phase Plan should make sure that construction workers take suitable precautions if working in enclosed spaces	Low
	Direct run off into surface waters e.g. River Humber and nearby drains	Controlled water courses e.g. River Humber and groundwater within superficial deposits (secondary A) and bedrock (secondary	Moderate	Concentrations of various substances were found to be present in the soils at concentrations above both relevant Water Target Values for those substances. However, analysis of groundwater samples does not indicate that those concentrations in soil are leading to exceedances in the underlying groundwater. An appropriate CEMP should minimise the risk of run-off from site-won material, while further risk assessment may be required with regard foundation design to prevent the creation of additional pathways to deeper bodies of groundwater. An appropriate risk assessment will be required for any piled foundations that are required in the final design. There are concentrations above the relevant WTV of a variety of contaminants in the soils below the site and deep foundations may create pathways through	Low
	Vertical and lateral migration in made ground/superficial deposits (Secondary A aquifer), including into deeper groundwater (Secondary B aquifer);		Moderate		Low

	Vertical and lateral migration of ground/surface waters along preferential pathways, including to surface waters;	B).	Moderate	less permeable layers from the unsaturated zone to sensitive groundwater below	Low
	Direct impact to buried infrastructure;	Buried infrastructure .e.g. pipes and underground utilities	Moderate/ Low	Elevated concentrations of sulphates have been noted in groundwater samples, but the water table is at sufficient depth and is largely confined by less permeable clay strata, so contact with buried services is unlikely as services will be located within clean backfill, in the unsaturated zone. Consideration of sulphates in groundwater may need to be given when designing building foundations, especially piled foundations. Advice should be sought from the local water supply company to confirm the appropriate pipe specification for the identified ground conditions and a UKWIR compliant risk assessment may be required to specify pipework.	Low
	Humber Estuary Ramsar, SPA, SSSI	Ecological receptors	Moderate	The distance to the Humber makes it unlikely that there is an unacceptable risk to ecological receptors, given the small number and relatively low magnitude of the exceedances detected during groundwater monitoring.	Low
Offsite power plant and oil refinery operations, including spills and leaks	Direct run off from on-site resources into surface waters e.g. River Humber and nearby drains;	Controlled water courses e.g. River Humber and deeper groundwater within superficial deposits (secondary A) and bedrock (secondary B);	Moderate	The ground investigation gave no indication of off-site contaminant sources transiting across the site as surface run off or within shallow groundwater. If such sources were found during construction phase, care should be taken to make sure that no preferential pathways are created. If this were to occur it would be notable as a health and safety issue during construction phase rather than as an ongoing environmental concern during operational phase.	Low
	Vertical and lateral migration in made ground/superficial deposits (Secondary A aquifer) beneath the site;		Moderate		Low
	Vertical and lateral migration of ground/surface waters along preferential pathways;		Moderate/ Low		Low
	Inhalation of vapours;	On-site construction workers Future site workers	Moderate/ Low	No contamination plume with potential to cause vapours was identified coming from the adjacent site.	Low

Offsite land use inc. sand/clay pits, landfill and petrol station	Direct run off from Off-site resources into surface waters e.g. River Humber and nearby drains;	On-site construction workers	Moderate	The ground investigation gave no indication of off-site contaminant sources transiting across the site as surface run off or within shallow groundwater. If such sources were found during construction phase, care should be taken to make sure that no preferential pathways are created. If this were to occur it would be notable as a health and safety issue during construction phase rather than as an ongoing environmental concern during operational phase.	Low
	Vertical and lateral migration in made ground/superficial deposits (Secondary A aquifer), including into deeper groundwater (Secondary B aquifer) beneath the site;	Controlled water courses e.g. River Humber and groundwater within superficial deposits (secondary A) and bedrock (secondary B)	Moderate		Low
	Vertical and lateral migration of ground/surface waters along preferential pathways;		Moderate		Low
	Direct impact to buried infrastructure onsite;	Buried infrastructure .e.g. pipes and utilities		The ground investigation did not indicate the presence of chemicals within the unsaturated zone which could cause harm to buried infrastructure. Advice should be sought from the local water supply company to confirm the appropriate pipe specification for the identified ground conditions. Concrete classification for foundation….. covered in section xx….	Low

7.3.4 Residual Contaminant Linkages

Following the Stage 2 Risk Assessment and consideration of the findings of the Ground Investigation, all outstanding pollutant linkages can be regarded as having a low level of risk, assuming that an appropriate CEMP is developed for the development and that appropriate risk assessment including consideration of ground conditions is applied to the design of piled foundations.

7.4 Summary of Contaminant Linkages

Table 22. Summary of Contaminant Linkages

	Conclusions	Recommendations
Buildings (Ground Gas)	A preliminary assessment of measured gas concentrations and flow rates in accordance with rates in accordance with BS8485:20015 has determined that the overall 'Characteristic Gas Classification' for the site is Category 2It is considered that in accordance the majority of the proposed power generation plant and buildings on site would fall into a Type D industrial style buildings which for a CS2 will require 1.5 points of gas protection however any smaller ancillary buildings will be classified as type C which will require 2.5 points of gas protection. However if Made Ground is removed as part of the pre-construction works the site would classify as CS1 where no protection measures are required.	Where required ground gas protection measures as defined in BS8485 should be incorporated in the buildings. Standard good health and safety practice and PPE should be specified within the Construction Phase Plan in order to protect construction workers from gas within confined spaces.
Human Health	Stage 2 Screening of laboratory samples against appropriate GAC does not indicate any risk to human health for the current or proposed land use. An appropriate CEMP and the use of standard PPE will be sufficient to protect construction workers from contact with substances present in the soil, given the concentrations encountered during the ground investigation.	No remedial actions are required to protect site users or future site users from substances in the soils. The stage 2 risk assessment does not assess the specific risks to construction workers, but appropriate PPE and CEMP precautions will be sufficient to mitigate risk to construction works.
Controlled Waters	Assessment of risks to controlled waters from leachable (soluble) concentrations of potentially polluting substances in soil, when compared conservatively against DWS and EQS, show a number of exceedances. However, this is not reflected in the groundwater below the site and the distance to sensitive surface waters makes the possibility of harm to sensitive controlled waters from leachable soil substances unlikely. There are concentrations above the relevant screening criteria for a variety of contaminants in the soils below the site and deep foundations may create pathways through less permeable layers from the unsaturated zone to sensitive groundwater below. However the risks associated with deep foundations can be mitigated by means of risk assessment specific to the design and construction proposals.	No remedial measures are required on site to protect controlled waters. However any piles should be designed in accordance with the EA guidance entitled *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination:* *Guidance on Pollution Prevention (2001)*
Ecological Receptors	The Humber Estuary and Rosper Road Pools represents ecological receptors, but the distance to the receptor is such that harm is unlikely to be caused.	Although it is not considered the site is a significant risk to Statutory ecological receptors . A landscape architected should be provided with the chemical analysis in order to establish suitable plant species for the site.
Subsurface infrastructure		Advice should be sought from the local water supply company to confirm the appropriate pipe specification for the identified ground conditions. Concrete Aggressivity is discussed in Section 5.5

8. Geotechnical Assessment

8.1 Proposed Works

As noted in Section 1, VPI Immingham LLP are exploring the development of several gas fired power generation and storage projects including reciprocating engines and an OCGT power plant. The new extension will be situated north of the current site, on land presently occupied by a car park and undeveloped land. At the time of writing this report, there is no structural loading information available so the following engineering assessment is based on general assumptions.

8.2 Engineering Assessment

With no structural loading or settlement criteria information available, it is assumed that the CHP extension will contain a number of relatively heavy and sensitive structures. The proposed site layout drawings presented in Appendix B also shows several individual buildings which are linked by connections or directly adjacent to one another. Possible foundation solutions that could be progressed for the project include:

8.2.1 Shallow Foundations

Based on the recent GI, Made Ground material typically extends up to 1.5m bgl. Due to its variable nature, the Made Ground strata could not be relied upon as a stable founding material. Should shallow foundations be used, they would need to be placed upon natural ground, such as the firm to stiff clay, Glacial Till layer. This could be in the form of a large raft foundation or individual pad foundations under the separate buildings. The 1986 version of BS8004 – Code of Practice for Foundations estimates that firm to stiff clays, like those encountered on site, could achieve typical allowable bearing resistance values between 75kN/m^2 to 150kN/m^2. Further analysis will need to be undertaken to assess the potential bearing pressures produced by the CHP extension in comparison with the soils bearing resistance.

BS8004 also notes that founding on firm to stiff clays of low to medium compressibility could lead to long-term consolidation settlement. It is therefore advised that the settlement of sensitive foundations/structures should be considered. Natural variations in the Glacial Till stiffness or composition could create differential displacements between individual pad foundations. Creating a large raft foundation to support groups of buildings could help control the differential displacement between points but would result in higher total settlements. It should be noted that, if a large raft foundation at > 2.0m depth is selected, large quantities of existing material would need to be excavated as part of the construction process. This could be both environmentally and economically expensive.

In summary, it is considered that lightly loaded structures of the appropriate structural form could be founded on shallow foundations placed in glacial till of at-least firm to stiff consistency at the site.

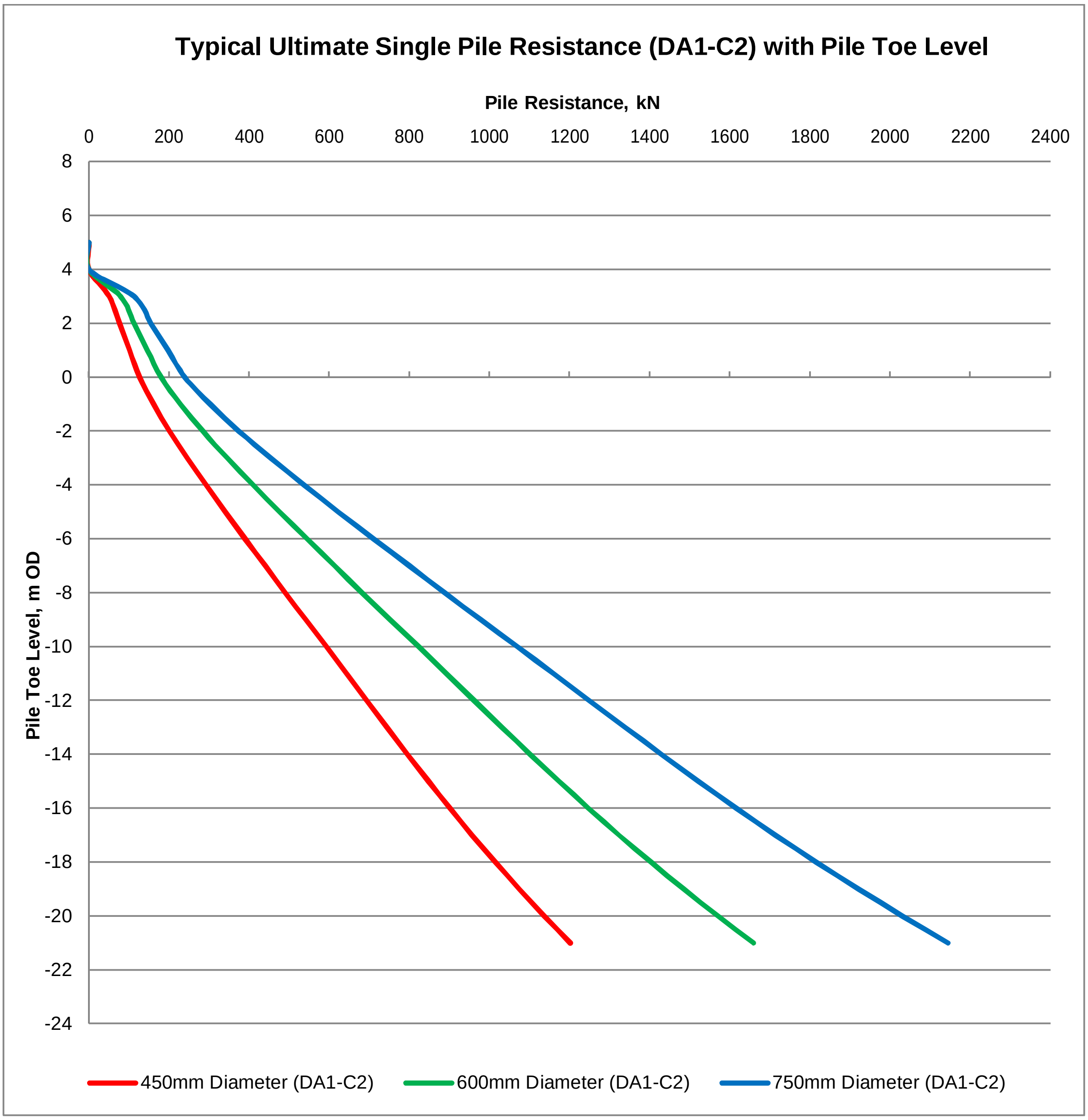
8.2.2 Deep Foundations

Deep foundations such as piles are often used to transfer loads through weak, compressible soils to more competent soils or rocks. In the case of the generation plant and buildings, should the applied structural loads or settlement criteria supersede the capacity of shallow foundations, as discussed in Section 7.2.1, deep piled foundations could be introduced. Based on the ground conditions summarised in Section 4 and Section 5, the piles would need to be drilled to a set depth within the Glacial Till stratum or socketed into the Burnham Chalk Formation. Without an indication of the typical pile loads, the pile lengths cannot be determined. Figure 7.2.2-1 however, gives an indication of the typical ultimate single pile resistance for a range of pile diameters. Pile resistances are produced for the more critical Design Approach 1 – Combination 2 (DA1-C2), which are based on guidance given in BS EN 1997-1:2004 – Eurocode 7 – Geotechnical Design.

The graph assumes that the piles are bored with a Continuous Flight Auger (CFA) and will terminate within the Glacial Till layer. Should the piles need to penetrate the Burnham Chalk Formation, further GI information will be required to develop a safe design.

Two design approaches can be adopted for piled foundations; placing the buildings on individual pile caps/rafts or creating a piled raft to cover large sections of the site. A piled raft will require a larger quantity of construction work but will ensure a stable design which will limit differential settlements between the buildings. Individual pile caps/rafts for separate buildings will allow for more flexibility in the pile design and enable costs to be optimised.

Both shallow and deep foundation options will need to be investigated further upon the release of more structural information.



9. Geotechnical Risk Register

9.1 Assessing Geotechnical Risk

A Geotechnical Risk Register has been compiled to show the degree of risk attached to various ground related aspects of the proposed scheme. The purpose of the register is to produce an assessment of the risk to the project posed by common ground related problems and identify suitable mitigation measures to control the risk to an acceptable level. The risk register should be developed and refined as the geotechnical design and assessment progress, such that the register will allow management of the geotechnical risks.

The inclusion of a risk in the risk register does not constitute confirmation that the problem actually exists at the site. A probability of 'very unlikely' is indicative of a condition which the available evidence suggests should not be present. For the purposes of this risk register, the magnitude of each impact and the resulting severity of risk is measured against that which would 'normally' be expected for each element.

The Geotechnical Risk Register has been developed in general accordance with the guidance presented in ICE/DETR Document 'Managing Geotechnical Risk' (2001) and the HA document HD41/03 and HD22/02. The degree of risk (R) is determined by combining an assessment of the probability (P) of the hazard with an assessment of the impact (I) the hazard and associated mitigation will cause if it occurs (R = P x I).

9.2 Geotechnical Hazards

The following section describes the ground-related hazards that have been identified during the investigation.

9.2.1 Variable Ground

Based on the 2018 Socotec UK Limited GI, up to 1.7m of Made Ground has been identified across the site. Due to nature of Made Ground, its properties are likely to be highly variable across the site. It is advised that any foundation solution does not rely on this material for support.

Granular layers within the Glacial Deposits could lead to settlement occurring at varying rates where these layers are and are not present. The possibility of differential settlement caused by such behaviours should be considered in the foundation design.

Burnham Chalk Formation was recorded at the base of four boreholes during the 2018 GI. The upper layers were described as weathered, extremely weak to weak chalk. Chalk is an unusual engineering material and can degenerate into a weak soil with intense weathering or mishandling. It also has the propensity to effectively re-cement with time. The design properties of Chalk are very variable, depending on the density and structure of the material. Should the proposed foundations terminate within, or close to, the Burnham Chalk Formation, further geotechnical information will be required to progress the design.

9.2.2 Ground Water

Seepages have been noted at various levels within the site. Where granular materials are present, water could flow at a relatively rapid rate, potentially undermining excavation stability. Water flowing from granular layers and from the chalk at depth which is under significant pressure could also have a detrimental effect on pile stability during construction. Continuous Flight Auger (CFA) piling, and / or bored piling under a bentonite drilling fluid, would help mitigate this problem.

9.2.3 Buried Obstructions or Services

As noted in Section 2, the site is largely surrounded by a mix of industrial and agricultural land use. This means there is the potential for buried services to be present at the site. Without service plans available, it should be assumed that there is a high risk of underground obstructions. Prior to the commencement of any construction work, further information on the potential services or buried obstructions should be sought from the relevant providers and then identified by inspection. Deeper areas of Made Ground and buried obstructions may be present at the site.

9.2.4 Risk Register of Geotechnical Hazards

The geotechnical risks associated with the proposed works are summarised in Table 22 below

Table 23 Hazard Index for Geotechnical Risk

Risk Number	Hazard/Risk	Cause	Risk Before Mitigation			Mitigation	Risk After Mitigation		
			P	I	R		P	I	R
GEO 001	Variable properties of Made Ground.	Historical site use	5	3	15	Proposed foundation solutions should not rely upon the Made Ground material. For example, piled foundations or shallow foundations founded on competent Glacial Till.	1	2	2
GEO 002	Limited ground information on Burnham Chalk Formation. Unable to derive accurate parameters for design, if required.	Insufficient borehole depth during previous ground investigations.	3	3	9	Should the proposed foundation solution come in close proximity to the Burnham Chalk Formation, further GI will be required to help derive accurate rock parameters for design.	1	2	2
GEO 003	Unknown services and buried obstructions at the site. Proposed foundation design could clash with services.	Historic site use.	4	4	16	Service plans are to be sought from providers prior to breaking ground. Area should also be surveyed to confirm potential services at the site. Buried obstructions / deep Made Ground are to be excavated during construction.	2	2	4
GEO 04	High ground water flow within granular soils and from the chalk Collapse of excavations/ pile holes.	Natural geology of the site.	3	3	9	Deep excavations should be supported when granular soils are present. CFA piling and / or use of bentonite drilling fluid should be used to construct piles.	1	2	2

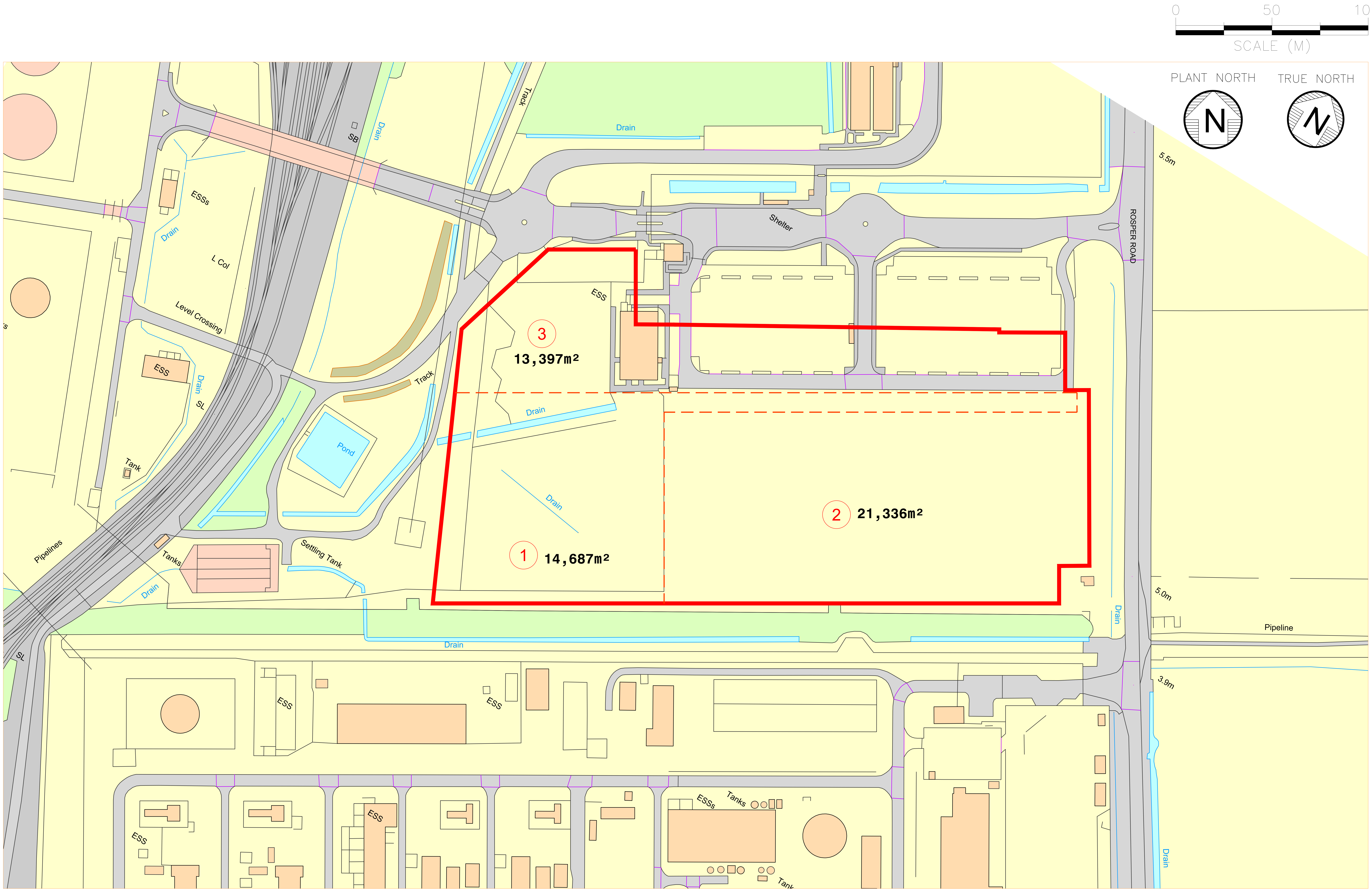
Risk = Probability x Impact (also see CIRIA SP125)

16-25	Very High Risk	Unacceptable. Re-examine activities to provide lower risk.
9-15	High risk	Further mitigation measures required and/or alter method of work. Seek approval from all stakeholders if risk cannot be reduced.
6-8	Medium Risk	Tolerable only if further mitigation is not reasonably practical and there is need to continue activity with identified controls.
1-5	Low Risk	Broadly acceptable if all reasonably practicable control measures in place.

10. References

1. Wroth, C. P. and Wood, D. M. (1978), The correlation of index properties with some basic engineering properties of soils, Canadian Geotechnical Journal, 15: 137-145.
2. Terzaghi, K. and Peck, R. B. (1967). Soil mechanics in engineering practice, 2^{nd} edition, Wiley International, New York.
3. British Standards Institute (2015), BS 8002: 2015 Code of Practice for Earth Retaining Structures, British Standards Institute.
4. Peck, R.B., Hanson, W.E. & Thornburn, T.H., (1974) Foundation Engineering. John Wiley & Sons.
5. CIRIA 143 (1995) the Standard Penetration Test (SPT): Methods and use.
6. Look, B (2007) Handbook of Geotechnical Investigation and Design Tables
7. Hobbs, N.B, (1974) Proceedings of a Conference on Settlement of Structures
8. ISTM Suggested Method of Point Load Strength 1974-2006
9. UK Specification for Ground Investigation, Second Edition (2012). ICE Publishing.
10. BRE Construction Division (2005), Concrete in Aggressive Ground, Special Digest 1:2005, 3rd Edition.
11. British Standards Institute (1990), BS 1377-2 Methods of test for Soils for civil engineering purposes - Part 2: Classification tests: British Standards Institute.
12. CIRIA C574 (2002) Engineering in Chalk
13. BS8004:2015. Code of Practice for Foundations
14. BS EN 1997-1:2004. Eurocode 7: Geotechnical Design
15. Foundation Design and Construction. MJ Tomlinson, 7th Edition. 2001
16. BS 8485:2015. Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
17. CIRIA C665:2007. Assessing risks posed by hazardous ground gases to buildings

Appendix A Site Location Plan/Proposed Site Layout Plan



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DATE	DESCRIPTION	DRN	CHK	APP

VPI Immingham

PROJECT
IMMINGHAM 'B'
PROJECT

FUNCTIONAL LOCATION
ICHP

SHT/SC. A1 1:1000
STATUS IFI
REV 0

DRAWN S.GARTSIDE
DATE 20/10/2017
APPROVED A.LEWIS
DATE 20/10/2017

TITLE
–
SITE LOCATION
SHEET 1

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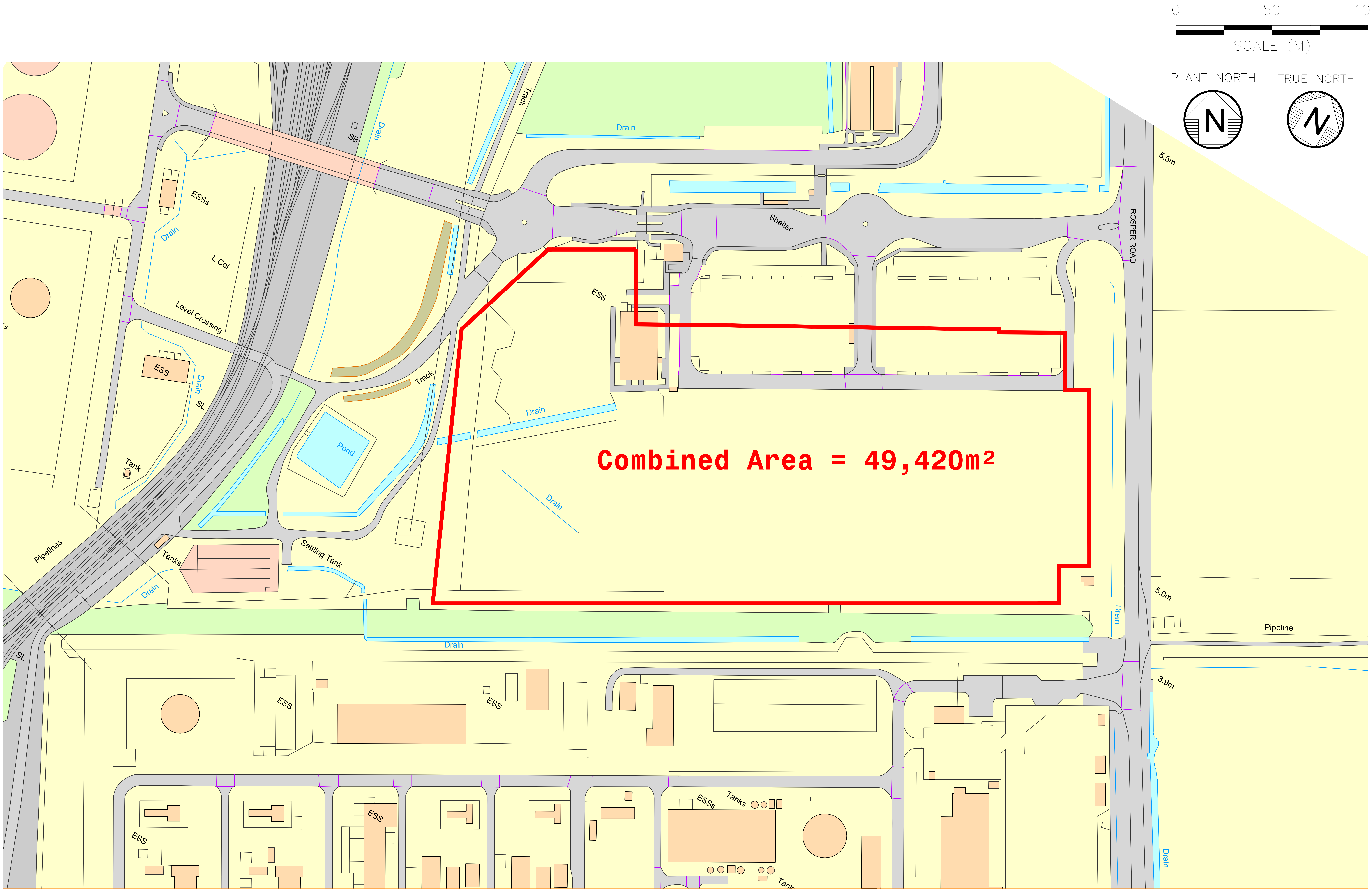
VPII-IMMB-PLOT-0001



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VPI Immingham

DRAWN S.GARTSIDE **DATE** 20/10/2017
APPROVED A.LEWIS **DATE** 20/10/2017

PROJECT
IMMINGHAM 'B'
PROJECT

TITLE
–
SITE LOCATION
SHEET 2

FUNCTIONAL LOCATION ICHP

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REV 0

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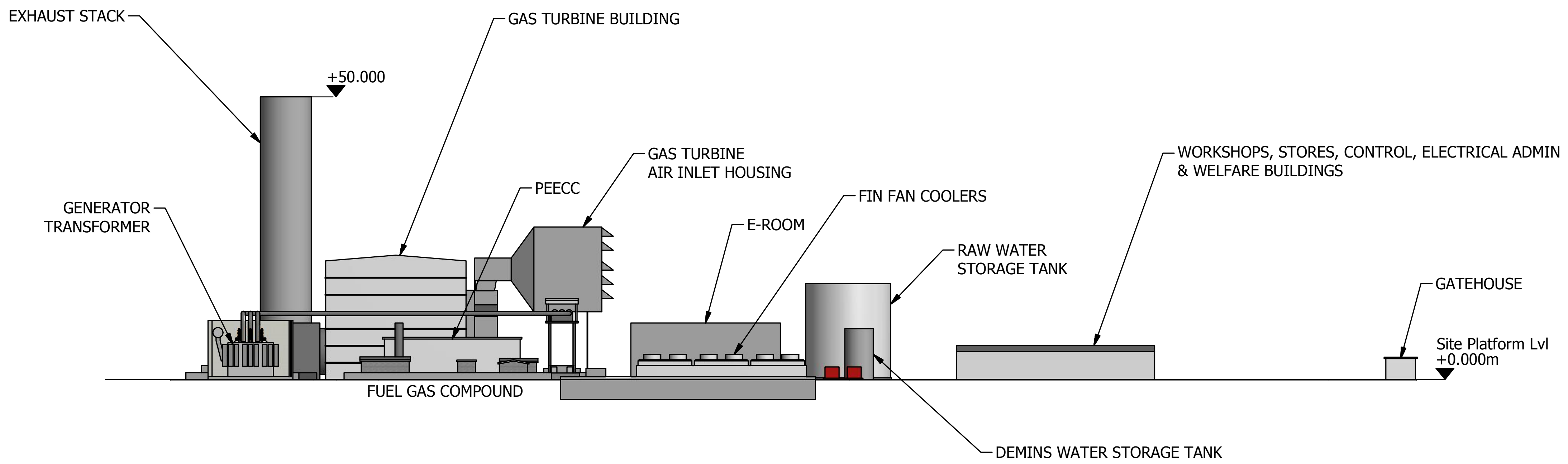

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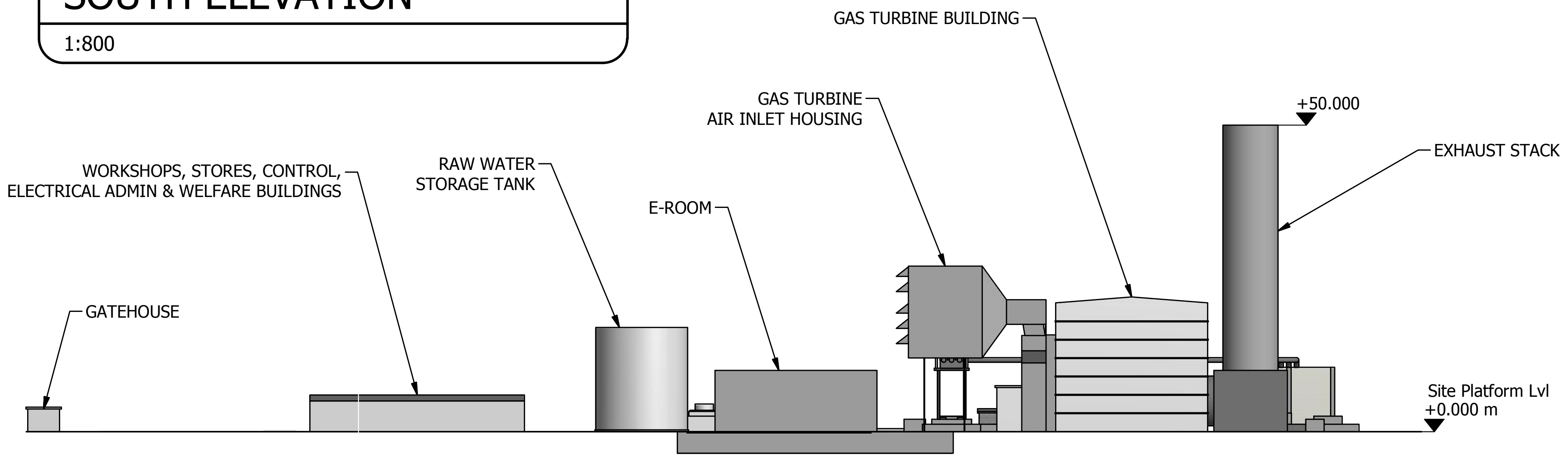

NORTH ELEVATION
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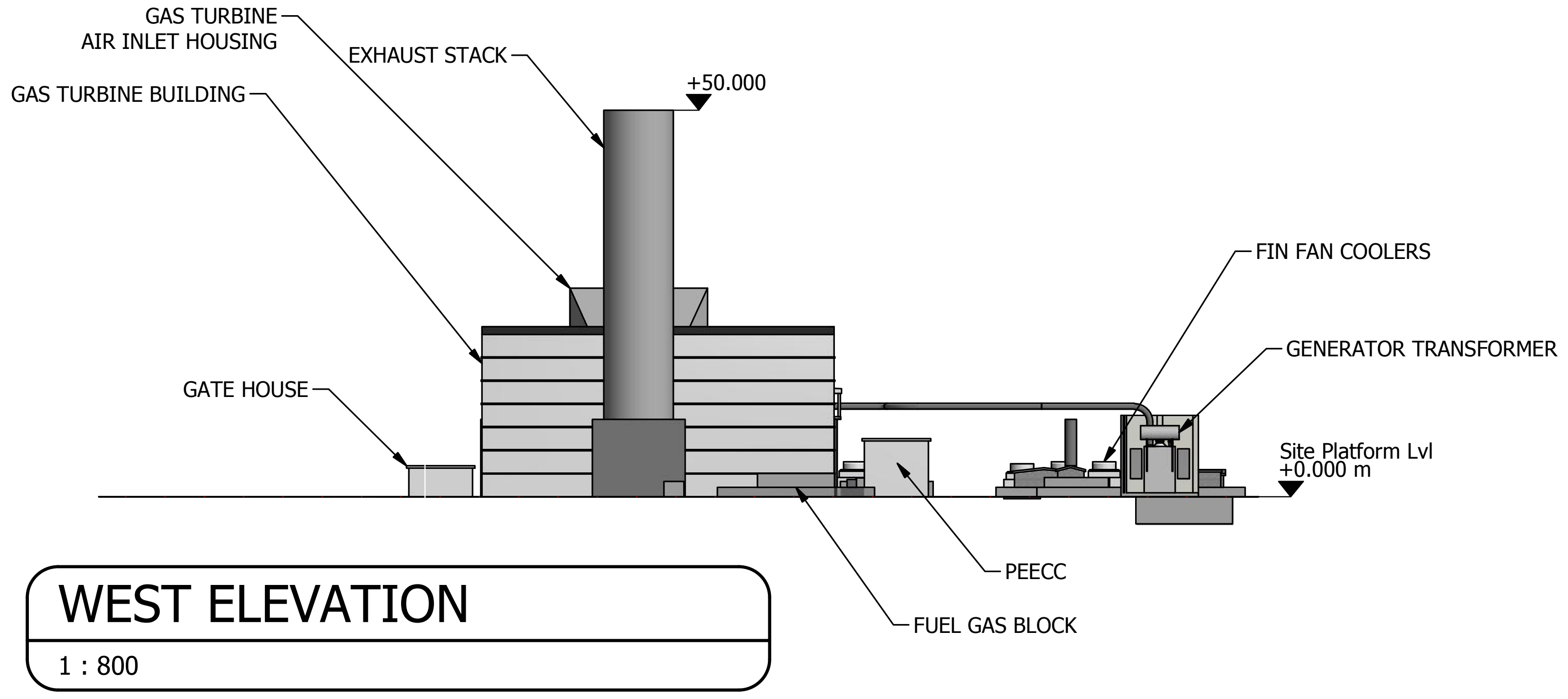

WEST ELEVATION
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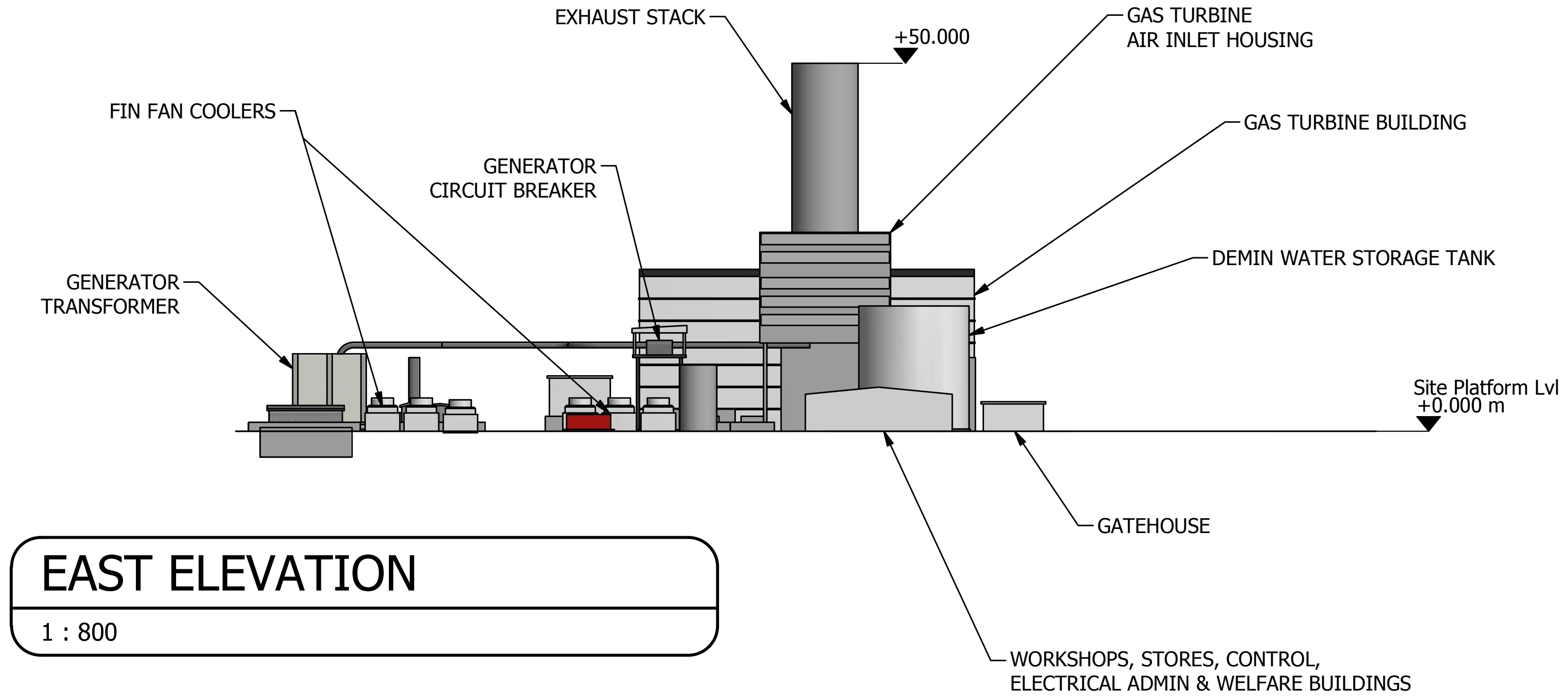
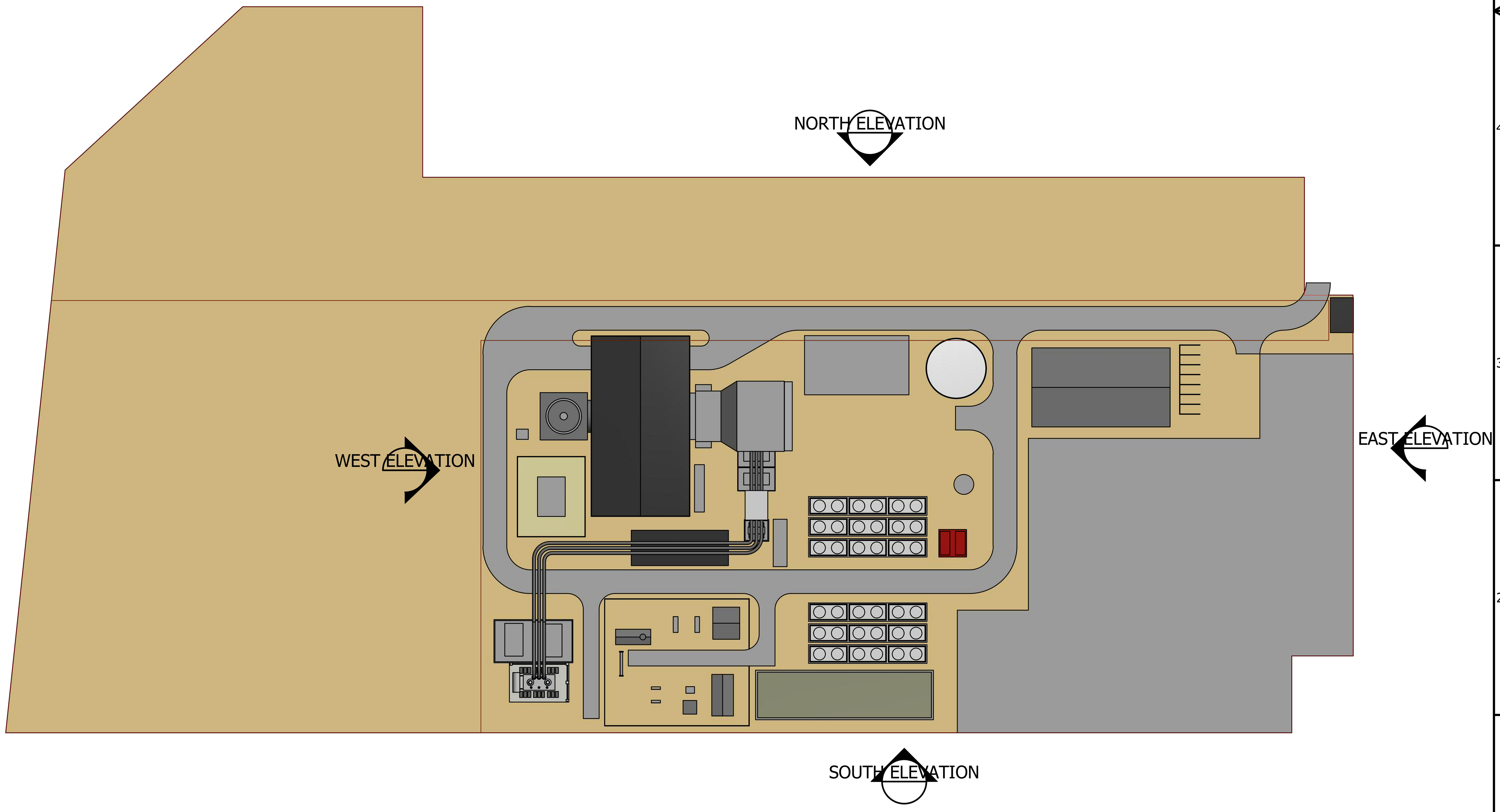


EAST ELEVATION
1 : 800

NOTE

FOR CLARITY, SECURITY FENCES AROUND THE GAS RECEIVING STATION AND SITE BOUNDARY ARE NOT SHOWN ON THESE ELEVATIONS



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VPI Immingham
VPI IMMINGHAM ENERGY PARK
PROJECT / DRAWING NUMBER: VPII-OCGT LAY-001A Sht 1 of 2
REV: 0
ENGINEER
DRAWN: S.GARTSIDE
CHECKED: M.SEAMAN
DATE: 04/07/18
ELEVATION VIEWS OF
PROPOSED INDICATIVE LAYOUT 1:
GE OCGT
CODE
AREA

Appendix B Risk Assessment Principles

Risk Assessment Principles

Current good practice recommends that the determination of hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Environment Agency guidance on Model Procedures for the Management of Land Contamination (CLR 11).

For a risk to be present, there must be a viable pollutant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.

Assessments of risks associated with each of these pollutant linkages are discussed in the following sections.

Using criteria broadly based on those presented in EA, Chartered Institute of Environmental Health (CIEH) and National House Building Council (NHBC) R&D Publication 66 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (2008), the magnitude of the risk associated with potential contamination at the site has been assessed. To do this an estimate is made of:

- The magnitude of the potential consequence (i.e. severity); and
- The magnitude of probability (i.e. likelihood).

The severity of the risk is classified according to the criteria in **Table C1**, below:

1. Table C1: Summary of Potential Pollutant Linkages

- SEVERITY	- DEFINITION AND EXAMPLES
Severe	- Acute risks to human health, likely to result in "significant harm" (e.g. very high concentrations of contaminants/ground gases) - Catastrophic damage to buildings/property (e.g. by explosion, sites with high gassing potential, extensive VOC contamination) - Major pollution of controlled waters (e.g. surface watercourses or Principal aquifers/source protection zones) - Short term risk to a particular ecosystem
Medium	- Chronic (long-term) risk to human health likely to result in "significant harm" (e.g. elevated concentration of contaminants/ground gases) - Pollution of sensitive controlled waters (e.g. surface watercourses or Principal/ Secondary aquifers) - Significant effects on sensitive ecosystems or species
Mild	- Pollution of non-sensitive waters (e.g. smaller surface watercourses or non-aquifers) - Significant damage to crops, buildings, structures or services (e.g. by explosion, sites with medium gassing potential, elevated concentrations of contaminants)
Minor	- Non-permanent human health effects (requirement for protective equipment during site works to mitigate health effects) - Damage to non-sensitive ecosystems or species - Minor (easily repairable) damage to buildings, structures or services (e.g. by explosion, sites with low gassing potential)

The probability of the risk occurring is classified according to the criteria in **Table C2**, below:

2. Table C2: Likelihood of Risk Occurrence

- LIKELIHOOD	- EXPLANATION
High	- Contaminant linkage may be present that appears very likely in the short-term and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor
Likely	- Contaminant linkage may be present, and it is probable that the risk will occur over the long term
Low	- Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	- Contaminant linkage may be present but the circumstances under which harm would occur even in the long-term are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in **Table C3**, below:

3. Table C3: Risk Based on Comparison of Likelihood and Severity

		SEVERITY			
LIKELIHOOD		**SEVERE**	**MEDIUM**	**MILD**	**MINOR**
	HIGH	Very High	High	Moderate	Moderate/Low
	LIKELY	High	Moderate	Moderate/Low	Low
	LOW	Moderate	Moderate/Low	Low	Very Low
	UNLIKELY	Moderate/Low	Low	Very Low	Very Low

Appendix C Factual Report

VPI IMMINGHAM

FACTUAL REPORT ON GROUND INVESTIGATION

Report No A8015-18

August 2018

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Report No A8015-18

August 2018

Issue No Date	Status	Prepared by	Checked by	Approved by
1 Jul 2018	Draft report	NAME and QUALIFICATIONS W Hopkins BSc (Hons)	NAME and QUALIFICATIONS T Clifford BEng FGS	NAME and QUALIFICATIONS T Clifford BEng FGS
		SIGNATURE Will Hopkins	SIGNATURE	SIGNATURE
2 Aug 2018	Final report	NAME and QUALIFICATIONS W Hopkins BSc (Hons)	NAME and QUALIFICATIONS T Clifford BEng FGS	NAME and QUALIFICATIONS T Clifford BEng FGS
		SIGNATURE Will Hopkins	SIGNATURE	SIGNATURE

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SOCOTEC UK Limited was formerly known as Environmental Scientifics Group Limited. The Certificate of Incorporation on Change of Name was filed on 16 October 2017.

CONTENTS

1 INTRODUCTION

In March 2018 SOCOTEC UK Limited was commissioned by AECOM Environmental Solutions Ltd (AECOM) on behalf of VPI Immingham, to carry out a ground investigation at Total Lindsey Oil Refinery (TLOR). The investigation was required to obtain geotechnical information for the proposed development.

The scope of the investigation was specified by AECOM and comprised cable percussion and rotary drilled boreholes, trial pits and laboratory testing. The investigation was performed in accordance with the contract specification, and the general requirements of BS 5930 (2015), BS EN 1997-2 (2007), BS EN ISO 22475-1 (2006) and other relevant related standards identified below. The fieldwork took place between 5 and 20 April.

This report presents the factual records of the fieldwork and laboratory testing. The information is also presented as digital data as defined in AGS (2017).

2 SITE SETTING

2.1 Location and Description

The site is adjacent to the east side of Total Lindsey Oil Refinery, approximately 4 km north west of Immingham town centre, Lincolnshire. The National Grid reference is TA 167 175, see Site Location Plan in Appendix A.

The site is a L-shaped parcel of land, approximately 350 by 200 m, and generally flat and level.

The majority of the site, the southern portion (about 350 by 120 m), comprises rough grass and scrub land, which is it is boggy in places. There are several soil mounds, up to about 5 m in height.

The north west portion is within the perimeter fence of the adjacent car park, and comprises a compacted generally flat hardcore surface with very little vegetation.

To the north the site is bound by a carpark, belonging to TLOR, and to the west is infrastructure associated with the refinery, including access roads, railway lines, plant and equipment. To the south is VPI Immingham, a power generation facility. To the east is open farmland and the Humber Estuary beyond, approximately 500 m away.

2.2 Published Geology

The published geological map for the area, BGS Sheet 90 (1990) and the BGS Geology of Britain Viewer (2018) show the site located on Glacial Till over bedrock of the Burnham Chalk Formation.

3 FIELDWORK

3.1 General

The exploratory hole locations were selected by AECOM and set out from local features. The co-ordinates and reduced levels were surveyed by SOCOTEC to National Grid and Ordnance Datum and the locations are shown on the Site Plan in Appendix A

3.2 Exploratory Holes

The exploratory holes are listed in the following table.

TABLE 1: SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	DEPTH RANGE (m)	REMARKS
Cable Percussion Boring	3	22.34 to 28.66	BH1, BH2 and BH5
Cable Percussion Boring extended by Rotary Core Drilling/Open Hole Drilling	3	28.60 to 34.60	BH3, BH4 and BH6
Dynamic Sampling	8	3.75 to 5.45	WS1 to WS8
Trial Pits/ Trenches	13	2.50 to 4.60	TP1 to TP10 and TT1 to TT3

The exploratory hole logs are presented in Appendix B. These provide information including the equipment and methods used, samples taken, tests carried out, water observations and descriptions of the strata encountered. Explanation of the terms and abbreviations used on the logs is given in the Key to Exploratory Hole Records in Appendix B, together with other explanatory information. The logging of soil and rock materials is in accordance with BS 5930 (2015).

Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011) and the SPT hammer energy ratio certificate is included in Appendix B. The SPT results are presented on the logs as uncorrected N values.

Photographs of the trial pits and rotary drilled core are presented in Appendix E.

On completion of the fieldwork geotechnical samples were transported to the Doncaster laboratory of SOCOTEC for testing and temporary retention.

3.3 Groundwater and Gas Monitoring

Instrumentation installed in the exploratory holes for groundwater and gas monitoring are shown on the logs and summarised in Appendix C. SOCOTEC were not required to undertake any post fieldwork.

4 LABORATORY TESTING

Geotechnical laboratory testing was scheduled by AECOM and was carried out in accordance with BS 1377 (1990), unless otherwise stated. The testing is summarised below and the results are presented in Appendix E.

- Moisture Content Determination
- Atterberg Limit Determination
- Particle Density
- Particle Size Distribution Analysis
- Unconsolidated Undrained Triaxial Compression Testing
- Consolidated Undrained Triaxial Compression Testing
- One Dimensional Oedometer Consolidation Testing
- Determination of Consolidation Properties Using a Hydraulic Cell
- Dry Density / Moisture Content Relationship
- California Bearing Ratio
- pH, Water Soluble Sulphate, Acid Soluble Sulphate and Total Sulphur Content of Soils Test methods are BS 1377 or others recognised in BRE Special Digest 1 (2005)
- Loss on Ignition
- Organic Matter

REFERENCES

AGS : 2017 : Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.

BGS England and Wales Sheet 90 : 1990 : Grimsby. 1:50,000 geological map (solid and drift). British Geological Survey.

BGS Geology of Britain Viewer : 2018. www.bgs.ac.uk. British Geological Survey.

BRE Special Digest 1 : 2005 : Concrete in aggressive ground. Building Research Establishment.

BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution.

BS EN 1997-2 : 2007 : Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS EN ISO 14688-1:2002+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14688-2:2004+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution.

BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock - Part 1 Identification and description. British Standards Institution.

BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.

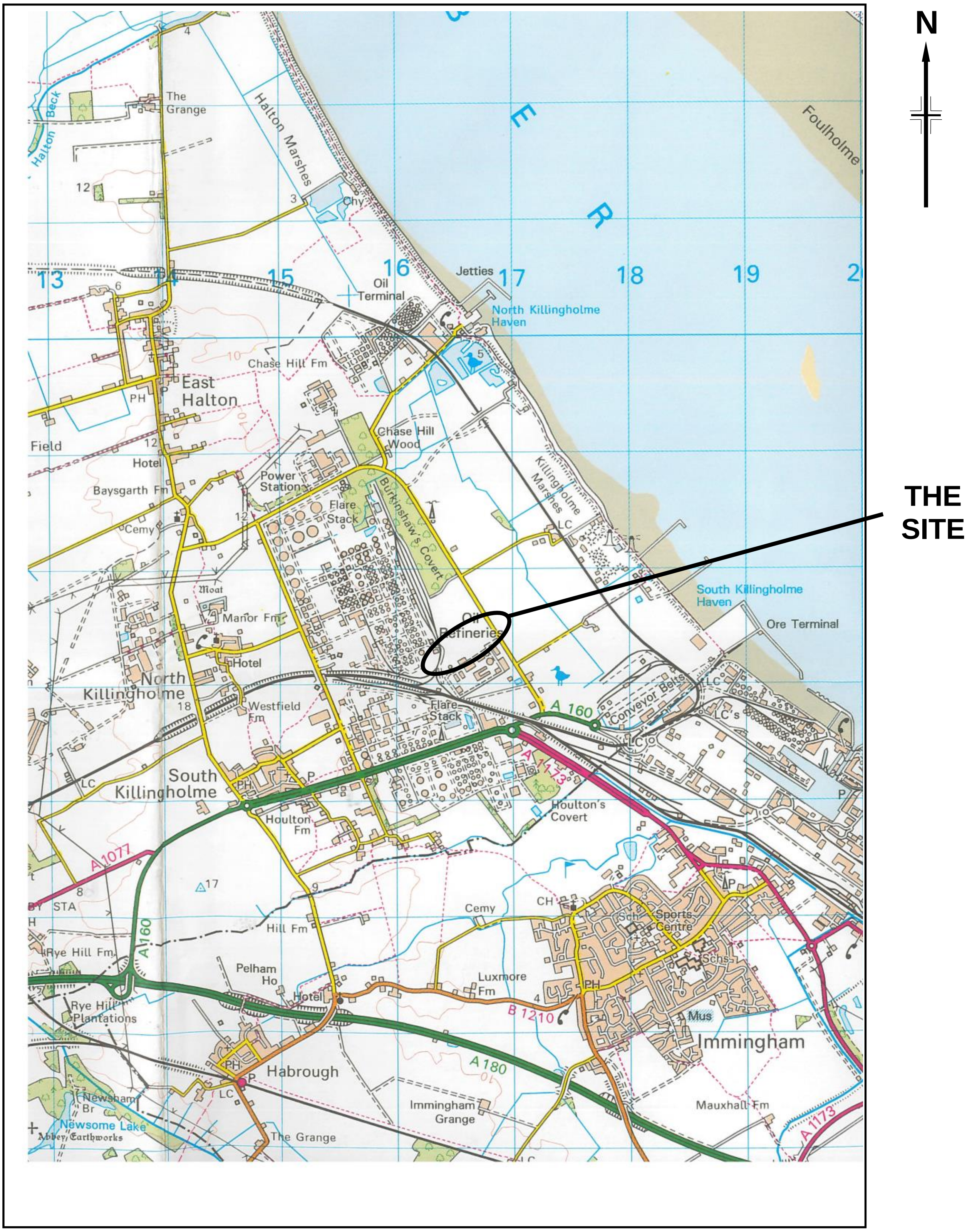
BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

APPENDIX A

FIGURES AND DRAWINGS

Site Location Plan

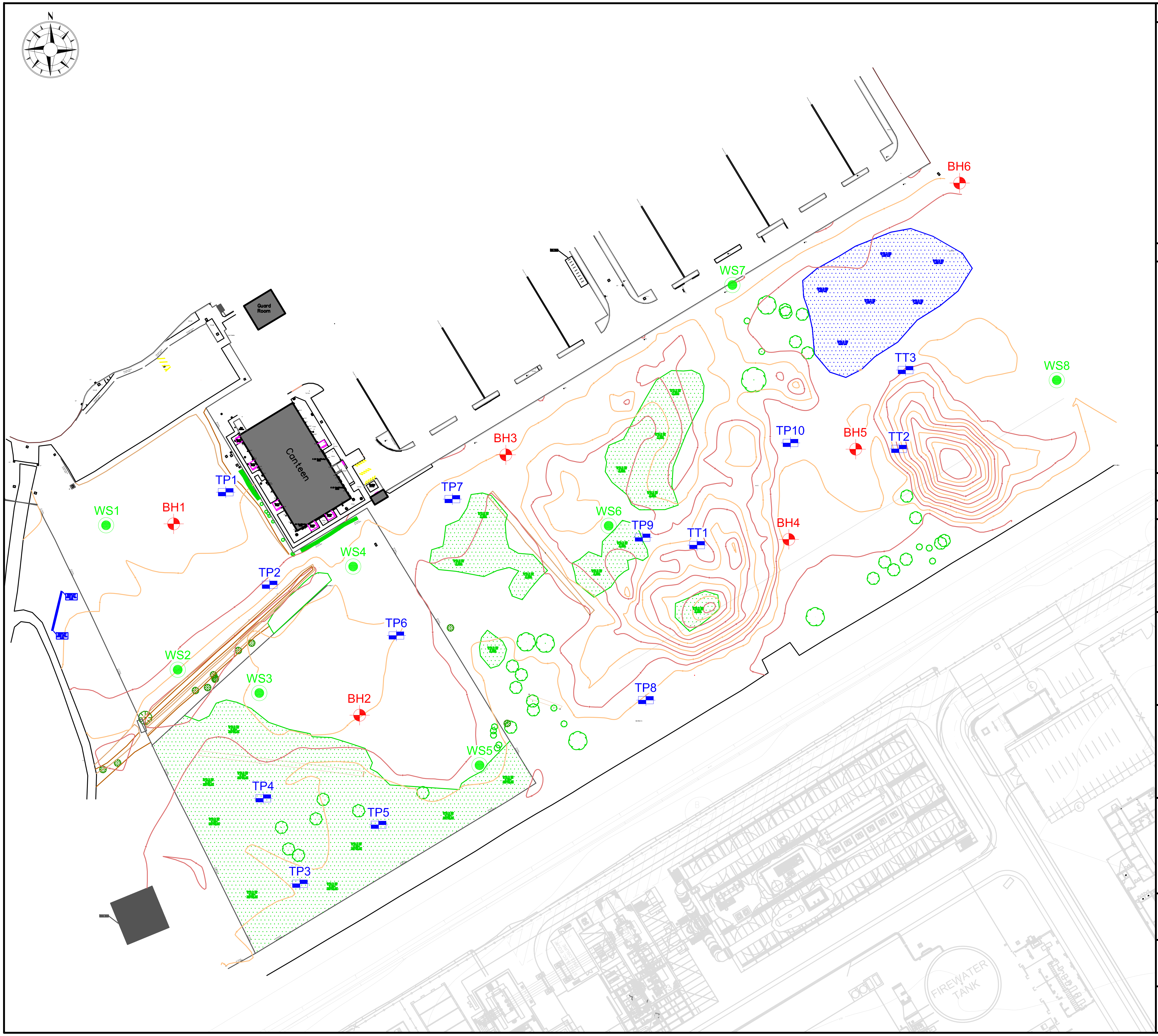
SOCOTEC



Reproduced from the 2006 Ordnance Survey 1:50 000 scale Landranger map No 113 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown copyright, Environmental Services Group Limited. All rights reserved. Licence Number 100006060

Notes:
Scale 1:50 000

Project	**VPI IMMINGHAM**	**Figure**
Project No.	**A8015-18**	**A1**
Carried out for	**AECOM**	



GENERAL NOTES

1. Reproduced from VPI Immingham's Drawing No. VPII–IMMB–CIV–CI01–0001.
2. Hole Locations to National Grid Co–ordinate Reference System.

LEGEND TO SYMBOLS

- 🟥 Borehole
- ● Window Sample
- ▨ Trial Pit

Scale: 1:1200

0 12m 24 36 48 60

x	x	x	x	x	x
Rev	Drawn	Date	Approv.	Date	Modification Details

AMENDMENTS

Title

SITE PLAN

Project

VPI IMMINGHAM

Client

AECOM
Environmental Solution Ltd

SOCOTEC

Date	Drawn By	Approv. By
04/06/2018	BS	WH

Sheet Size	Scale	Project No
A3	1:1200	A8015-18

Drawing No	Rev
A2	0

APPENDIX B

EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	nominally 100 mm diameter and full recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample from dynamic (windowless) sampling. Full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
C / CS	Core sample (from rotary core) taken for laboratory testing.	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that, while an attempt was made to take a tube sample, there was no recovery.

Samples taken from borehole installations (ie water or gas) after hole construction are not shown on the exploratory hole logs.

Specimens for point load testing undertaken on site (or other non-lab location) are not shown on the log.

IN SITU TESTS

SPT S or SPT C — Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3:2005+A1:2011.
The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	*in situ* vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930:2015

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacing measurements are presented.
NI	The term non-intact (NI) is used where the core is fragmented.
NA	Used where a measurement is not applicable (eg. If, SCR and RQD in non-rock materials).

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss

GROUNDWATER

▼	Groundwater entry
▽	Depth to groundwater after standing period

Notes:

See report text for full references of standards.

Updated October 2017

Project	**VPI Immingham**
Project No.	**A8015-18**
Carried out for	**AECOM Environmental Solutions Ltd**

Key

Key to Exploratory Hole Records

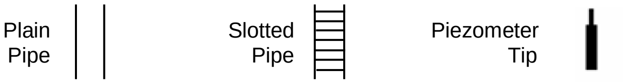
INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer



Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:

ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator

Settlement Points or Pressure Cells

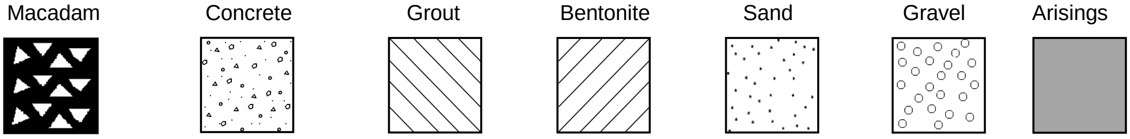
The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column:

ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
EPCE	Electronic embedment pressure cell
PPCE	Electronic push in pressure cell

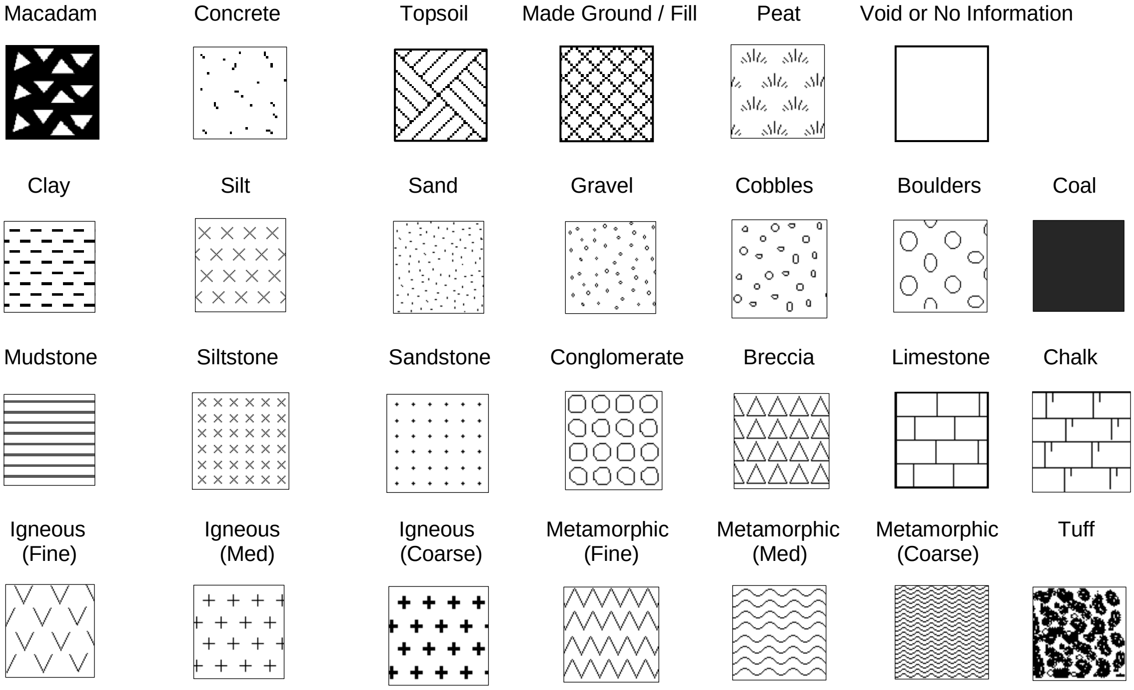
INSTALLATION / BACKFILL LEGENDS

A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill materials are indicated below.



STRATUM LEGENDS

The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols may be used.



Notes:

See report text for full references of standards.

Updated October 2017

Project	**VPI Immingham**
Project No.	**A8015-18**
Carried out for	**AECOM Environmental Solutions Ltd**

Key

Sheet 2 of 3

Key to Exploratory Hole Records

NOTES

1 Soils and rocks are described in accordance with BS EN ISO 14688-1:2002+A1:2013 and 14689-1:2003 respectively as amplified by BS 5930:2015.

2 For fine soils, consistency determined during description is reported for those strata where undisturbed samples are available. Where the logger considers that the sample may not be representative of the condition in situ, for whatever reason, the reported consistency is given in brackets. The reliability of the sample is indicated by Probably or Possibly as appropriate. Hence (Probably firm) indicates the logger is reasonably confident of the assessment, but (Possibly firm) means less certainty. Where the samples available are too disturbed to allow a reasonable assessment of the in situ condition, no consistency is given.

3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs. However, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.

4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures.

6 Observations of discernible groundwater entries during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.

7 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

REFERENCES

1 BS EN ISO 14688-1:2002+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil. Part 1 Identification and description. British Standards Institution

2 BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock. Part 1 Identification and description. British Standards Institution

3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing. Part 3 Standard penetration test. British Standards Institution

4 BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution

Notes:

See report text for full references of standards.

Updated October 2017

Project **VPI Immingham**

Project No. **A8015-18**

Carried out for **AECOM Environmental Solutions Ltd**

Key

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR1940
Test Date: 21/09/2017
Report Date: 21/09/2017
File Name: AR1940.spt
Test Operator: SH

Instrumented Rod Data

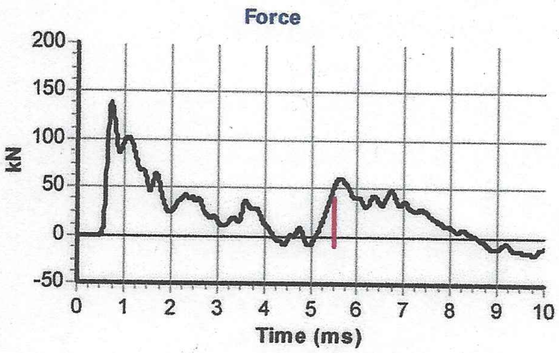
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

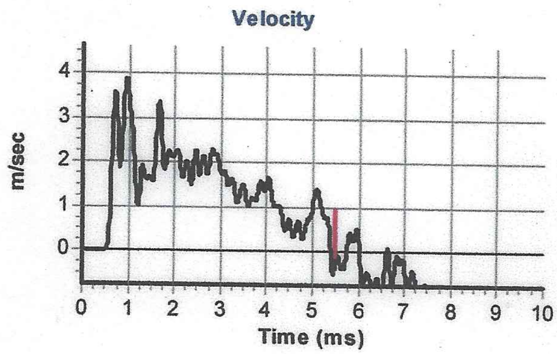
SPT Hammer Information

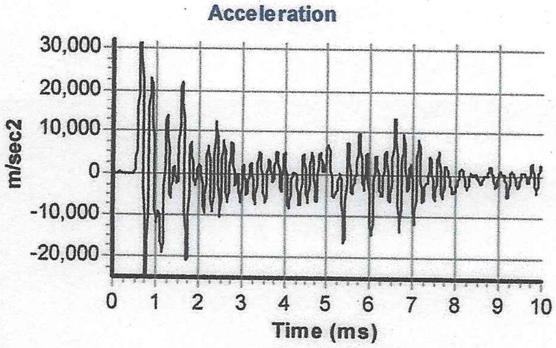
Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

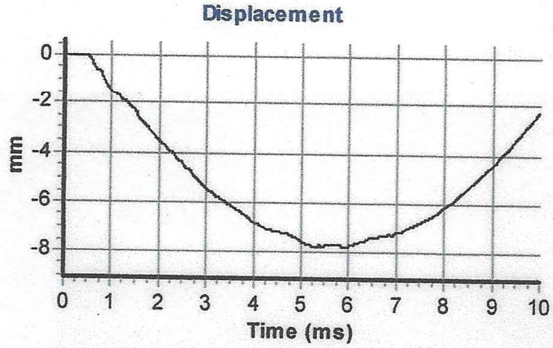
Comments / Location

CALIBRATION









Calculations

Area of Rod A (mm2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 332

Energy Ratio E_r (%): 70

Signed: M.GARDNER
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref:	AR2068
Test Date:	15/12/2017
Report Date:	15/12/2017
File Name:	AR2068.spt
Test Operator:	SH

Instrumented Rod Data

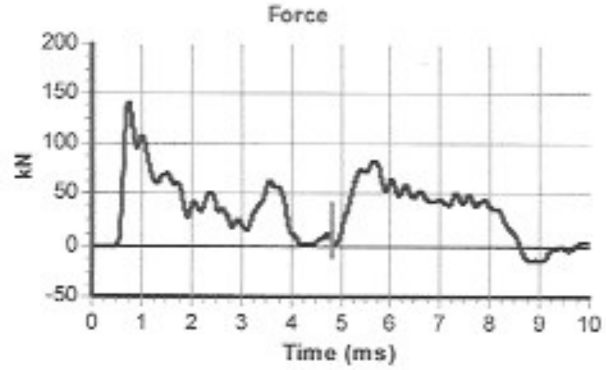
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	7080
Accelerometer No.2:	11609

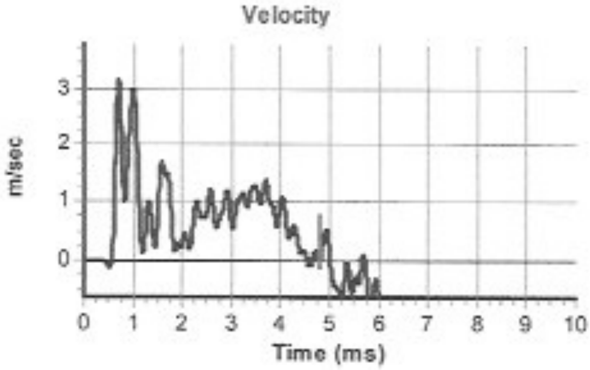
SPT Hammer Information

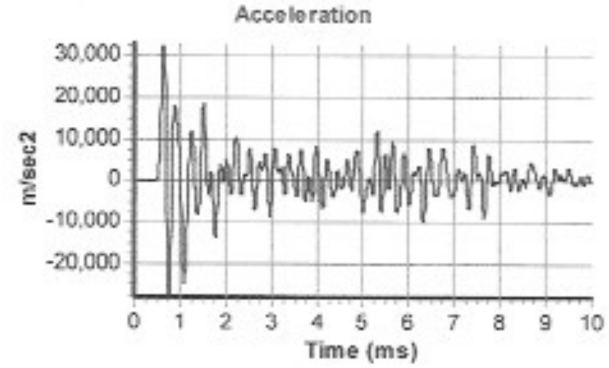
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

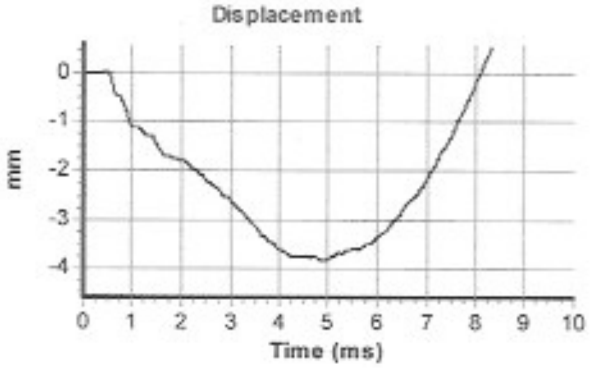
Comments / Location

CALIBRATION









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	296
Energy Ratio E_r (%):	**63**

Signed: M.GARDNER
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX59JP

SPT Hammer Ref:	DART235
Test Date:	13/04/2017
Report Date:	13/04/2017
File Name:	DART235.spt
Test Operator:	SH

Instrumented Rod Data

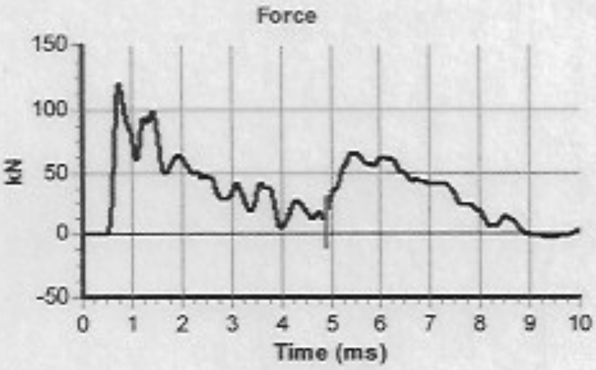
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	7080
Accelerometer No.2:	11609

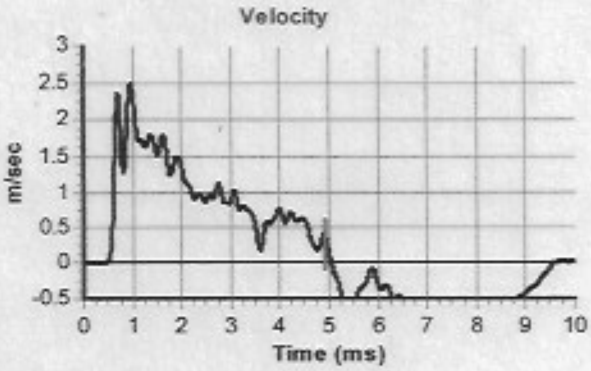
SPT Hammer Information

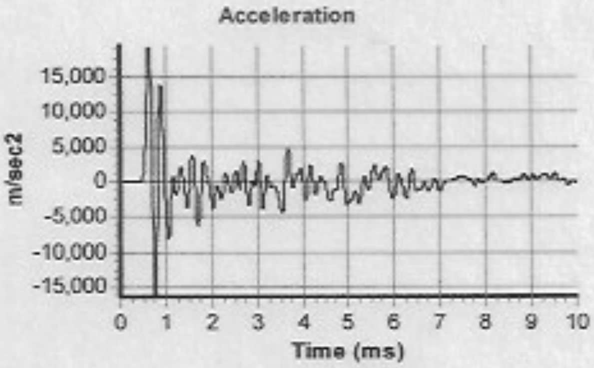
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

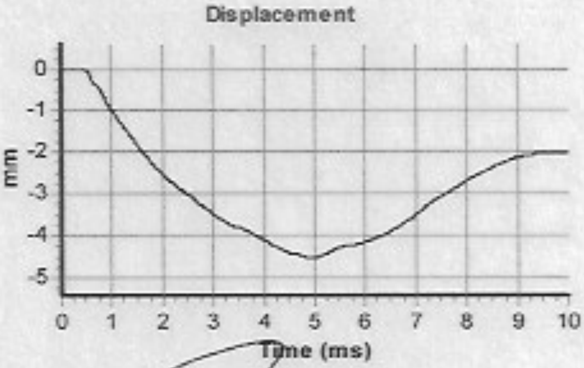
Comments / Location

CALIBRATION









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	276
Energy Ratio E_r (%):	**58**

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

SPTMAN ver.1.93 All rights reserved, Testconsult ©2010

Borehole Log

SOCOTEC

Drilled	GC	**Start**	05/04/2018
Logged	MJS		
Checked	TC	**End**	11/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	14.00	200	14.00
14.00	28.50	150	28.50

Ground Level	6.36 mOD
Coordinates (m)	E 516528.04
National Grid	N 417415.39

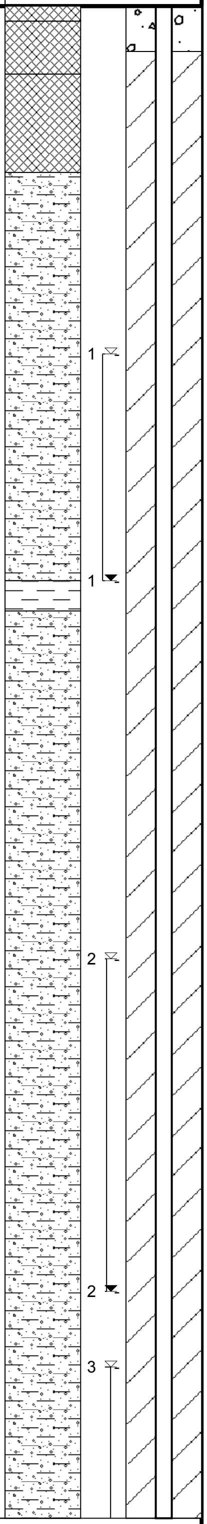
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
0.10	D 1	0.00-1.20 Hand excavated inspection pit.		
0.20 - 0.40	B 2			
0.45	D 3			
0.50 - 0.70	B 4			
1.00 - 1.20	B 5		05/04/18	1800 Dry
1.20 - 1.65	UT 6	52 blows 100% rec	06/04/18	0800 Dry
1.65 - 1.80	D 7			
2.00 - 2.45	SPTS	N=25 (3,4/5,6,7,7)	1.70	Dry
2.00 - 2.45	D 8			
2.50 - 3.00	B 9			
3.00 - 3.45	UT 10	56 blows 100% rec	2.80	Dry
3.45 - 3.60	D 11			
3.80	W 14			
4.00 - 4.45	SPTS	N=14 (2,2/3,3,4,4)	3.90	Dry
4.00 - 4.45	D 12			
4.00 - 4.45	B 13			
5.00 - 5.45	UT 15	50 blows 100% rec	4.70	Dry
5.45 - 5.60	D 16			
6.50 - 6.95	SPTS	N=14 (2,2/3,3,4,4)	4.70	Dry
6.50 - 6.95	D 17			
7.00 - 7.50	B 18			
7.20	D 19			
8.00 - 8.45	UT 20	38 blows 100% rec	4.70	Dry
8.45	B 21			
8.50	W 21A			
9.50 - 9.95	SPTS	N=14 (2,3/3,3,4,4)	9.20	Dry
9.50 - 9.95	D 22			
9.50 - 10.00	B 23			

Strata Description

Main	Detail	Depth	Level	(Thickness)
Brown sandy clayey GRAVEL. Gravel is angular to subangular fine to coarse of chalk and limestone. (MADE GROUND)		0.10	+6.26	(0.10)
Brown, locally greyish brown, slightly sandy gravelly CLAY. Gravel is angular fine to coarse of chalk and mudstone. Strong hydrocarbon odour. (MADE GROUND)		0.45	+5.91	(0.35)
Greyish brown, locally dark grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of slag, mudstone, sandstone and chalk. Strong hydrocarbon odour. (MADE GROUND)	1.10-1.20 locally dark grey, occasional rootlets	1.10	+5.26	(0.65)
Stiff brown, locally mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of quartz, mudstone, sandstone and chalk.		3.80	+2.56	(2.70)
Thinly laminated brown, locally light grey, CLAY with frequent gravel size pockets of fine to coarse sand.		4.00	+2.36	(0.20)
Stiff, becoming very stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk, sandstone, mudstone and quartz.	7.10-8.40 locally sandy			(9.00)

Legend Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	3.80	Rose to 2.30 m after 20 minutes. Medium inflow	4.00
2	8.50	Rose to 6.30 m after 20 minutes. Medium inflow	9.00

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:20

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

BH1

Sheet 1 of 3

Borehole Log

Drilled	GC	**Start**	05/04/2018
Logged	MJS		05/04/2018
Checked	TC	**End**	
Approved	TC		11/04/2018

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	14.00	200	14.00
14.00	28.50	150	28.50

Ground Level	6.36 mOD
Coordinates (m)	E 516528.04
National Grid	N 417415.39

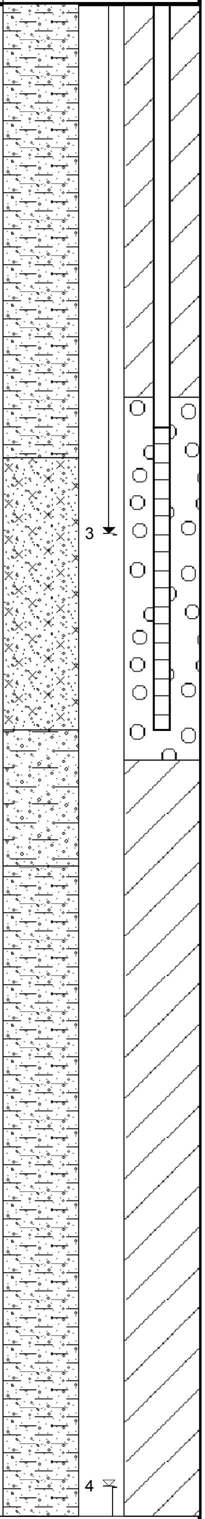
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
11.00 - 11.45	UT 24	40 blows 100% rec	9.20	Dry
11.45 - 11.60	D 25			
12.50 - 12.95 12.50 - 12.95	SPTS D 26	N=31 (5,5/6,7,8,10)	9.20	Dry
13.00 13.00 - 13.50	D 28 B 27			
13.50	W 30			
14.00 - 14.45 14.00 - 14.45	SPTS D 29	N=10 (3,3/2,3,2,3)	9.20	10.00
			06/04/18 9.20	1800 10.00
			09/04/18 9.20	0800 3.80
14.80	D 31			
15.00 - 15.50	B 32			
15.50 - 15.95 15.50 - 15.95	SPTS D 33	N=28 (3,3/5,5,8,10)	15.00	10.00
16.00 - 17.00	B 34			
17.00 - 17.45	UT 35	78 blows 100% rec	16.50	15.00
17.45 - 17.60	D 36			
18.50 - 18.77 18.50 - 18.77 18.50 - 19.00	SPTS D 37 B 38	50 (15,10 for 50mm/23,27 for 70mm)	18.00	17.00

Strata Description

Main	Detail	Depth, Level (Thickness)
Stiff, becoming very stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk, sandstone, mudstone and quartz.		
Medium dense brown gravelly very silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse of chalk and flint.		13.00 -6.64 (1.80)
Medium dense brown sandy slightly clayey GRAVEL. Gravel is angular to subangular fine to coarse of flint and chalk.		14.80 -8.44 (0.90)
Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and rare flint.	17.10 becoming greyish brown	15.70 -9.34 (5.80)

Legend Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
3	13.50	Rose to 9.00 m after 20 minutes. Fast inflow	

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
14.50 - 14.80	60	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50 14/08/2018 13:42:20

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH1

Sheet 2 of 3

Borehole Log

Drilled	GC	**Start**	05/04/2018
Logged	MJS		
Checked	TC	**End**	
Approved	TC		11/04/2018

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	14.00	200	14.00
14.00	28.50	150	28.50

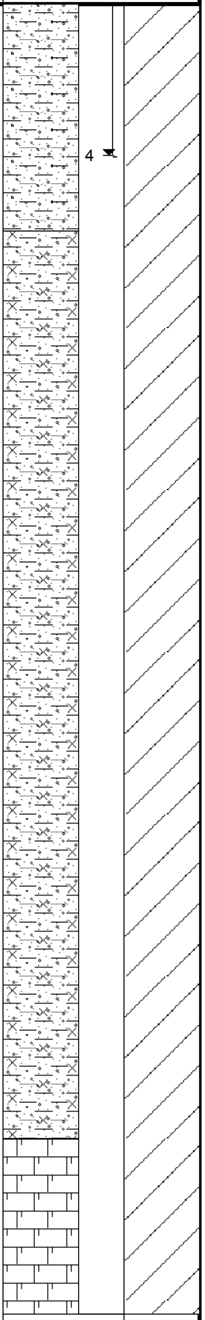
Ground Level	6.36 mOD
Coordinates (m)	E 516528.04
National Grid	N 417415.39

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
20.00 - 20.40	UT 39	100 blows 56% rec	19.50	19.50
20.40 - 20.50	D 40			
21.00 - 21.50	B 41			
21.50 - 21.79 21.50 - 21.79	SPTS D 42	50 (10,15 for 60mm/22,25,3 for 5mm)	19.50	20.00
22.50 - 22.70 22.50 22.50 - 22.70	SPTS UT NR D 43	50 (25 for 75mm/28,22 for 55mm) 100 blows No Recovery	09/04/18 19.50	1800 20.00
			10/04/18 19.50	0800 9.00
23.00 - 24.00	B 44			
24.00 - 24.28 24.00 - 24.28	SPTS D 45	50 (15,10 for 45mm/20,27,3 for 5mm)	23.50	10.00
25.00 - 25.22 25.00 - 25.22	SPTS D 46	50 (20,5 for 15mm/25,25 for 60mm)	24.90	8.00
26.00 - 26.22 26.00 - 26.22 26.00 - 27.00	SPTS D 47 B 48	50 (25 for 75mm/27,23 for 65mm)	25.90 10/04/18 25.90	8.00 1700 8.00
			11/04/18 25.90	0800 4.00
27.50 - 27.78 27.50 - 27.78 27.50 - 28.50	SPTS D 49 B 50	50 (15,10 for 50mm/22,24,4 for 5mm)	27.50	7.00
28.50 - 28.66 28.50 - 28.66	SPTS D 51	50 (25 for 60mm/38,12 for 20mm)	11/04/18 28.50	1500 9.00

Strata Description

Main	Detail	Depth, Level (Thickness)
Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and rare flint.		
Very stiff light grey slightly sandy gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of chalk.	25.50 recovered as clayey angular fine to coarse gravel	21.50 -15.14 (6.00)
Extremely weak to very weak white CHALK. Recovered as gravelly clay. Gravel is angular to subangular fine to coarse.		27.50 -21.14 (1.16)
END OF EXPLORATORY HOLE		28.66 -22.30



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
4	21.00	Rose to 19.80 m after 20 minutes. Medium inflow	

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
24.50 - 26.00	180	Chisel
26.50 - 27.50	120	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:20

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH1

Sheet 3 of 3

Borehole Log

SOCOTEC

Drilled	GC	**Start**	
Logged	WH	11/04/2018	
Checked	TC	**End**	
Approved	TC	16/04/2018	

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	14.50	200	14.50
14.50	22.20	150	22.20

Ground Level	5.43 mOD
Coordinates (m)	E 516588.10
National Grid	N 417353.62

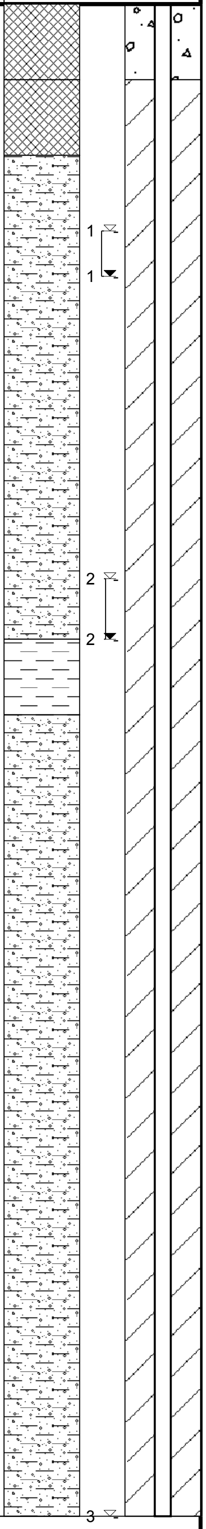
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
		0.00-1.20 Hand excavated inspection pit.		
0.20	D 1			
0.30 - 0.50	B 2			
0.60	D 3			
0.60 - 1.00	B 4			
1.00	D 5			
1.00 - 1.20	B 6			
1.20 - 1.65	UT 7	30 blows 100% rec		Dry
1.65 - 1.80	D 8			
1.80 - 2.25	SPTS	N=13 (2,2/2,3,4,4)		1.50
1.80 - 2.25	D 9			
1.80 - 2.25	B 10		11/04/18	1800 1.50
2.20 - 2.70	B 13			
2.25 - 2.70	UT NR	28 blows No Recovery	12/04/18	0800 2.00
2.70 - 2.80	D 12			
2.80 - 3.25	SPTS	N=15 (1,2/3,3,4,5)	1.70	Dry
2.80 - 3.25	D 14			
3.30 - 3.75	UT 15	45 blows 100% rec	1.70	Dry
3.75 - 3.90	D 16			
3.90 - 4.35	SPTS	N=15 (6,7/4,3,3,5)	2.90	Dry
3.90 - 4.35	D 17		3.90	Dry
3.90 - 4.35	B 18			
4.00 - 4.45	UT NR	36 blows No Recovery		
4.45 - 4.60	D 20			
4.60 - 5.05	SPTS	N=17 (2,2/3,4,4,6)	4.50	4.00
4.60 - 5.05	D 21			
4.60 - 5.05	B 27			
5.10 - 5.55	UT 28	38 blows 100% rec	5.00	4.80
5.55 - 5.70	D 29			
5.70 - 6.15	SPTS	N=25 (3,4/5,6,7,7)	5.60	Dry
5.70 - 6.15	D 30			
5.70 - 6.15	B 31			
6.50 - 6.95	UT NR	48 blows No Recovery	6.00	Dry
6.50 - 7.00	B 33			
7.10 - 7.55	SPTS	N=22 (3,4/4,5,6,7)	6.00	Dry
7.10 - 7.55	D 34			
7.10 - 7.55	B 35			
8.00 - 8.45	UT 36	60 blows 100% rec	6.00	Dry
8.45 - 8.60	D 37			
8.60 - 9.05	SPTS	N=27 (3,4/5,7,7,8)	6.00	Dry
8.60 - 9.05	D 38			
8.60 - 9.05	B 39			
9.50 - 9.95	UT 40	62 blows 100% rec	6.00	Dry
9.95 - 10.10	D 41			

Strata Description

Main	Detail	Depth, Level (Thickness)
Dark brown sandy very gravelly CLAY with high cobble content. Gravel is subrounded fine to coarse of various lithologies including chalk, macadam and sandstone. Cobbles are subrounded of chalk. (MADE GROUND)		(0.50) 0.50 +4.93
Dark brown and black very gravelly very silty fine to coarse SAND. Gravel is subangular fine to coarse of chalk and sandstone. Strong hydrocarbon odour. (MADE GROUND)		(0.50) 1.00 +4.43
Firm dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular medium of flint and chalk.		(3.20) 4.20 +1.23
Brown mottled grey CLAY.	4.45 slightly gravelly sandy, gravel is subangular fine of chalk and mudstone	(0.50) 4.70 +0.73
Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of sandstone and chalk.		(9.40)

Legend **Backfill**



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	1.80	Rose to 1.50 m after 20 minutes. Slow inflow	
2	4.20	Rose to 3.80 m after 20 minutes. Slow inflow	5.00

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:21

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH2

Borehole Log

SOCOTEC

Drilled	GC	**Start**	11/04/2018
Logged	WH		
Checked	TC	**End**	16/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	14.50	200	14.50
14.50	22.20	150	22.20

Ground Level	5.43 mOD
Coordinates (m)	E 516588.10
National Grid	N 417353.62

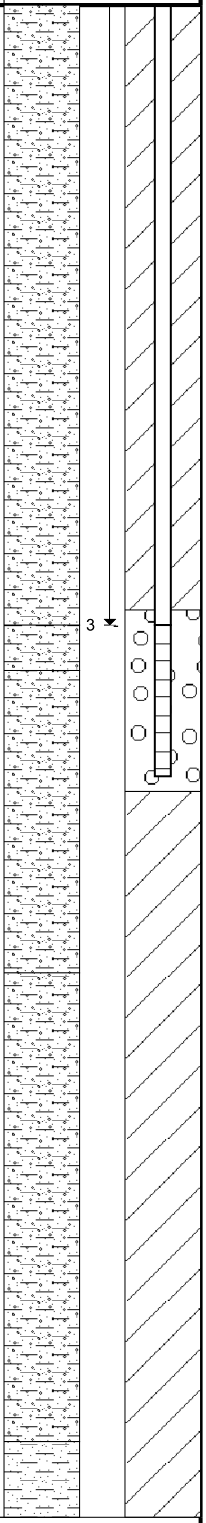
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
10.10 - 10.55	SPTS	N=22 (3,4/4,5,6,7)	6.00	Dry
10.10 - 10.55	D 42			
10.10 - 10.55	B 43			
11.00 - 11.45	UT 44	64 blows 100% rec	6.00	Dry
11.45 - 11.60	D 45			
11.60 - 12.05	SPTS	N=23 (3,4/4,5,6,8)	6.00	Dry
11.60 - 12.05	D 46			
11.60 - 12.05	B 47			
12.50 - 12.95	UT 48	70 blows 100% rec	6.00	Dry
12.95 - 13.10	D 49			
13.10 - 13.55	SPTS	N=30 (4,6/6,7,8,9)	6.00	Dry
13.10 - 13.55	D 50			
13.10 - 13.55	B 51			
14.00 - 14.45	UT NR	80 blows No Recovery	6.00	Dry
14.00 - 14.60	B 53			
14.10	W 59			
14.60 - 15.05	SPTS	N=39 (7,8/10,10,9,10)	14.50	10.00
14.60 - 15.05	D 54			
15.20	D 55			
15.50 - 15.95	UT 56	70 blows 33% rec	14.50	10.00
16.20 - 16.65	SPTS	N=37 (6,8/8,9,10,10)	15.50	7.00
16.20 - 16.65	D 57			
16.40 - 17.00	B 58			
			12/04/18 16.50	1800 7.00
17.00 - 17.45	UT 60	55 blows 56% rec		
			13/04/18 16.50	0800 5.00
17.45 - 17.60	D 61			
17.60 - 18.05	SPTS	N=35 (3,5/7,8,10,10)	16.50	5.00
17.60 - 18.05	D 62			
18.50 - 18.95	UT NR	60 blows No Recovery	18.40	9.00
18.50 - 19.00	B 63			
19.10 - 19.55	SPTS	N=35 (4,6/7,8,9,11)	18.40	9.00
19.10 - 19.55	D 64			
19.50	D 65			

Strata Description

Main	Detail	Depth, Level (Thickness)
Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of sandstone and chalk.		14.10 -8.67
Firm light brown sandy very gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and mudstone.		(0.30) 14.40 -8.97
Firm to stiff light brown sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone and flint. Occasional gravel size pockets of fine to medium sand.		(2.00) 16.40 -10.97
Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of chalk.	17.45-18.05 light grey silty fine to coarse sand	(3.10) 19.50 -14.07
Stiff to very stiff brownish grey slightly sandy CLAY with occasional gravel. Gravel is subangular fine to medium of chalk.		

Legend Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
3	14.10	Rose to 10.00 m after 20 minutes. Medium inflow	

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:21

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH2

Sheet 2 of 3

Borehole Log

SOCOTEC

Drilled	GC	**Start**	11/04/2018
Logged	WH		
Checked	TC	**End**	
Approved	TC		16/04/2018

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	14.50	200	14.50
14.50	22.20	150	22.20

Ground Level	5.43 mOD
Coordinates (m)	E 516588.10
National Grid	N 417353.62

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
20.00 - 20.45	UT 66	100 blows 56% rec	20.00	11.00
20.60 - 20.93 20.60 - 20.93 20.60 - 21.00	SPTS D 67 B 68	50 (12,13 for 65mm/17,21,12 for 40mm)	20.00	11.00
21.50 - 21.64 21.50 - 21.64	SPTS D 69	50 (25 for 50mm/42,8 for 10mm)	21.00	11.00
			13/04/18	1800
			21.50	11.00
			16/04/18	0800
			21.50	6.00
			16/04/18	1000
22.20 - 22.34 22.20 - 22.34	SPTS D 70	50 (25 for 50mm/39,11 for 15mm)	22.20	8.00

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend	Backfill
Stiff to very stiff brownish grey slightly sandy CLAY with occasional gravel. Gravel is subangular fine to medium of chalk.		(2.84) 22.34 -16.91		
END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
21.90 - 21.90	180	Chisel
21.90 - 22.20	60	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:21

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH2

Sheet 3 of 3

Borehole Log

SOCOTEC

Drilled	SS/MB	**Start**	11/04/2018
Logged	MJS/PC		
Checked	TC	**End**	16/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	28.00	200	28.00
28.00	28.60	146	28.00

Ground Level	5.43 mOD
Coordinates (m)	E 516635.31
National Grid	N 417437.68

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
		0.00-1.20 Hand excavated inspection pit.		
0.40 - 1.20	B 1			
1.20 - 1.65 1.20 - 1.65	SPTS D 2	N=16 (3,4/4,4,4,4)	1.20	Dry
1.65 - 2.00	B 3			
2.00 - 2.45 2.00 - 2.45	SPTS D 4	N=13 (3,3/3,4,3,3)	1.50	Dry
2.50 - 3.00	B 5			
3.00 - 3.45 3.00 - 3.45	SPTS D 6	N=8 (1,2/2,2,2,2)	1.50	1.10
3.50 - 4.00	B 7			
4.00 - 4.45 4.00 - 4.45	SPTS D 8	N=13 (2,2/3,3,3,4)	4.00	Dry
4.50 - 5.00	B 9			
5.00 - 5.45	UT 10	39 blows 100% rec	4.50	Dry
5.45 - 5.65	D 11			
5.65 - 6.00	B 12			
6.00 - 6.45 6.00 - 6.45	SPTS D 13	N=22 (3,3/4,6,6,6)	6.00	Dry
6.50 - 7.10	B 14			
7.50 - 7.95	UT 15	49 blows 100% rec	7.50	Dry
7.95 - 8.15	D 16			
8.15 - 8.60 8.15 - 8.60	SPTS D 17	N=23 (3,3/4,5,6,8)	7.50	Dry
8.60 - 9.00	B 18			
9.00 - 9.45	UT 19	59 blows 100% rec	9.00	Dry
9.45 - 9.65	D 20			
9.65 - 10.10 9.65 - 10.10	SPTS D 21	N=29 (3,5/7,7,8,7)	9.50	Dry

Strata Description

Main	Detail	Depth, Level (Thickness)
Firm brown, locally mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of quartz, sandstone, chalk and mudstone.	0.00-1.20 occasional rootlets	(3.00) 3.00 +2.43
Firm thinly laminated brown CLAY with frequent partings of fine to medium sand.		(0.70) 3.70 +1.73
Medium dense brown slightly gravelly very silty fine to medium SAND. Gravel is angular to subrounded fine to medium of various lithologies.		(0.80) 4.50 +0.93
Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, quartz and sandstone.	7.10-7.40 foreman reports reddish brown sand 7.40 becoming greyish brown	(8.80)

Legend · Backfill

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	3.00	Rose to 1.10 m after 20 minutes.	3.60
2	7.10	Rose to 4.15 m after 20 minutes.	7.40

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:22

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH3

Borehole Log

SOCOTEC

Drilled	SS/MB	**Start**	11/04/2018
Logged	MJS/PC		
Checked	TC	**End**	16/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	28.00	200	28.00
28.00	28.60	146	28.00

Ground Level	5.43 mOD
Coordinates (m)	E 516635.31
National Grid	N 417437.68

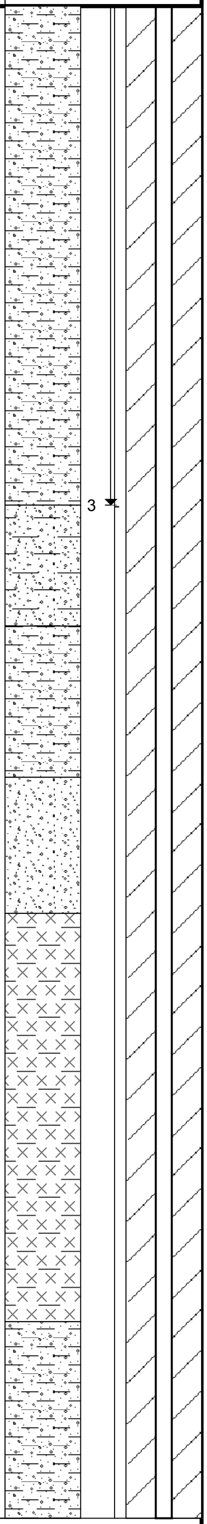
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
10.00 - 10.50	B 22			
10.50 - 10.95	UT 23	76 blows 100% rec	10.50	Dry
10.95 - 11.15	D 24			
11.00 - 12.00	B 26			
11.15 - 11.60	SPTS	N=36 (4,6/7,9,11,9)	11.00	Dry
11.15 - 11.60	D 25			
12.00 - 12.45	UT 27	69 blows 100% rec	12.00	Dry
12.45 - 12.65	D 28			
12.65 - 13.10	SPTS	N=30 (3,5/5,7,9,9)	12.00	Dry
12.65 - 13.10	D 29			
12.80 - 13.30	B 30			
13.50 - 13.95	SPTS	N=11 (1,2/2,3,3,3)	12.00	7.90
13.50	D 31			
13.50 - 13.95	D 32			
14.10 - 15.00	B 33			
			11/04/18 15.00	1700 7.00
15.00 - 15.45	SPTS	N=11 (2,3/2,2,3,4)		
15.00 - 15.45	D 34			
			12/04/18 15.00	0800 3.30
16.00 - 16.50	B 35			
16.50 - 16.77	SPTS	57 (10,15 for 60mm/28,29 for 60mm)	16.50	5.10
16.50 - 16.80	D 36			
17.00 - 18.00	B 37			
18.00 - 18.20	SPTS	50 (15,10 for 50mm/50 for 70mm)	18.00	Dry
18.00 - 18.30	D 38			
18.60 - 19.50	B 39			
19.50 - 19.75	SPTS	50 (11,14 for 50mm/22,28 for 50mm)	19.50	Dry
19.50 - 19.80	D 40			

Strata Description

Main	Detail	Depth, Level (Thickness)	
Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, quartz and sandstone.			
Medium dense greenish brown gravelly clayey fine to medium SAND. Gravel is angular to subrounded fine to coarse of various lithologies. Occasional gravel size pockets of clay.		13.30 (0.80)	-7.87
Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk, quartz, sandstone and mudstone.		14.10 (1.00)	-8.67
Medium dense yellowish brown gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of various lithologies. Occasional gravel size pockets of clay.		15.10 (0.90)	-9.67
Grey slightly sandy clayey SILT. Rare subangular fine to medium gravel of chalk.		16.00 (2.70)	-10.57
Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.		18.70	-13.27

Legend **Backfill**



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
3	13.30	Rose to 6.10 m after 20 minutes.	14.10

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50 14/08/2018 13:42:22

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH3

Sheet 2 of 3

Borehole Log

SOCOTEC

Drilled	SS/MB	**Start**	11/04/2018
Logged	MJS/PC		
Checked	TC	**End**	16/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	28.00	200	28.00
28.00	28.60	146	28.00

Ground Level	5.43 mOD
Coordinates (m)	E 516635.31
National Grid	N 417437.68

Samples and Tests

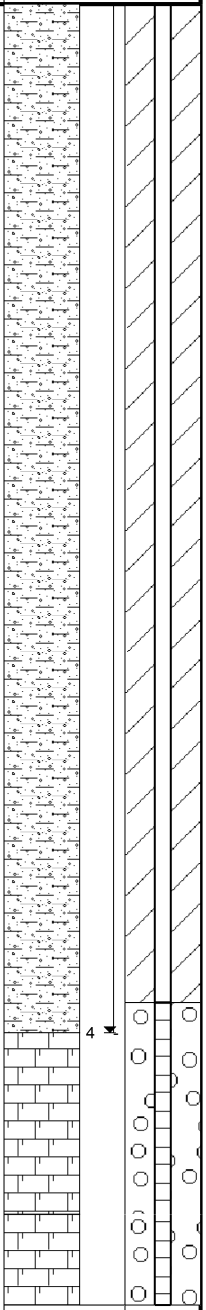
Depth	Type & No. TCR SCR RQD	If	Records	Date Casing	Time Water
20.00 - 21.00	B 41				
21.00 - 21.20 21.00 - 21.30	SPTS D 42		50 (19,6 for 10mm/31,19 for 40mm)	21.00	Dry
22.00 - 22.50	B 43				
22.50 - 22.62 22.50 - 22.70	SPTS D 44		50 (25 for 75mm/50 for 40mm)	22.50	Dry
23.00 - 24.00	B 45				
				12/04/18 24.00	1700 Dry
24.00 - 24.14 24.00 - 24.10	SPTS D 46			13/04/18 24.00	0800 19.30
25.00 - 25.50	B 47				
25.50 - 25.62 25.50 - 25.62	SPTS D 48		50 (25 for 75mm/50 for 50mm)	25.50	Dry
26.00 - 26.50	B 49				
26.80 - 27.02 26.80 - 27.02 27.00 - 27.50	SPTS D 50 B 51		50 (18,7 for 10mm/28,22 for 60mm)	26.50	8.70
				13/04/18 28.00	1630 4.10
28.00 - 28.10 28.00 - 28.60	42 0 0	- NI -	50 (25 for 60mm/50 for 40mm) Flush: 28.00 - 28.60 Air/mist 100%	16/04/18 28.00	1300 0.70
				16/04/18 28.00	1700 0.70

Strata Description

Main	Detail	Depth	Level	(Thickness)
Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.	24.00 becoming locally gravelly	26.80	-21.37	(8.10)
Extremely weak white CHALK. Recovered as gravelly clay. Gravel is angular to subangular fine to coarse of chalk with rare flint.	27.00 becoming recovered as clayey angular fine to coarse gravel	28.00	-22.57	(1.20)
Medium strong white CHALK. Recovered as subangular to subrounded fine to coarse gravel.		28.60	-23.17	(0.60)

END OF EXPLORATORY HOLE

Legend **Backfill**



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
4	26.80	Rose to 8.70 m after 20 minutes.	

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
27.60 - 28.00	60	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:22

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

BH3

Sheet 3 of 3

Borehole Log

Drilled	SS/MB	**Start**	16/04/2018
Logged	WH/PC		
Checked	TC	**End**	
Approved	TC		20/04/2018

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.00	200	16.50
24.00	34.60	146	28.60

Ground Level	4.19 mOD
Coordinates (m)	E 516726.70
National Grid	N 417410.38

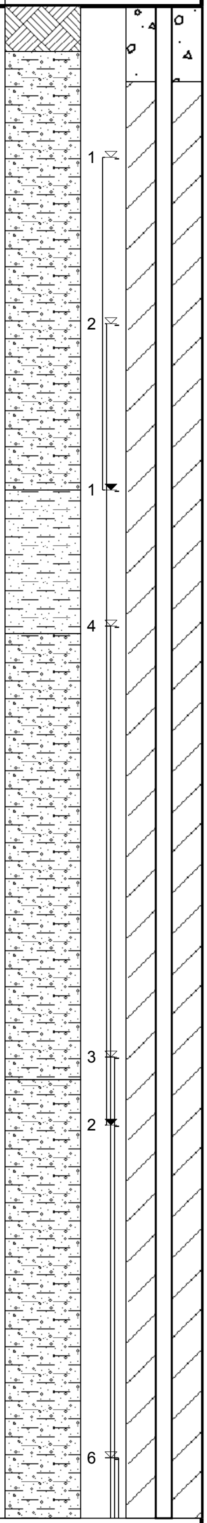
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
		0.00-1.20 Hand excavated inspection pit.		
0.50 - 1.20	B 1			
1.20 - 1.65 1.20 - 1.65	SPTS D 2	N=16 (2,3/4,4,4,4)	1.20	Dry
1.65 - 2.00	B 3			
2.00 - 2.45	UT 4	59 blows 100% rec	1.50	Dry
2.45 - 2.65	D 5			
2.65 - 3.10 2.65 - 3.10	SPTS D 6	N=15 (2,3/3,4,3,5)	1.50	Dry
3.10 - 3.55	UT 7	51 blows 100% rec	3.00	Dry
3.75 - 4.20 3.75 - 4.20	SPTS D 8	N=6 (1,2/1,2,1,2)	3.00	1.00
4.00 - 4.50	B 9			
4.50 - 4.95	UT 10	47 blows 100% rec	4.50	Dry
4.95 - 5.15	D 11			
5.15 - 5.60 5.15 - 5.60	SPTS D 12	N=22 (2,3/4,6,6,6)	4.50	Dry
5.50 - 6.00	B 13			
6.00 - 6.45	UT 14	42 blows 100% rec	6.00	Dry
6.45 - 6.65	D 15			
6.65 - 7.10 6.65 - 7.10	SPTS D 16	N=24 (2,3/4,6,6,8)	6.00	Dry
			16/04/18 6.00	1700 2.10
7.20 - 7.50	B 17		17/04/18 6.00	0800 2.00
7.50 - 7.95	UT 18	51 blows 100% rec	7.50	Dry
7.95 - 8.15	D 19			
8.15 - 8.60 8.15 - 8.60	SPTS D 20	N=25 (4,4/5,6,7,7)	7.50	Dry
8.50 - 9.00	B 21			
9.00 - 9.45	UT 22	42 blows 100% rec	9.00	Dry
9.65 - 10.10 9.65 - 10.10	SPTS D 23	N=23 (3,4/5,5,7,6)	9.00	Damp

Strata Description

Main	Detail	Depth, Level (Thickness)
Light brown, mottled grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone with frequent rootlets. (TOPSOIL)		(0.30) 0.30 +3.89
Firm brown, mottled grey and light brown, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, flint and sandstone.		(2.90) 3.20 +0.99
Soft brown very sandy CLAY.	3.55 brown clayey sand	(0.95) 4.15 +0.04
Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk and sandstone.	7.10-7.20 fine sand and gravel	(2.95) 7.10 -2.91
Stiff to very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.		(4.90)

Legend / Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	3.20	Rose to 1.00 m after 20 minutes.	4.15
2	7.40	Rose to 2.10 m after 20 minutes.	7.20

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

14/08/2018 13:42:23

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH4

Sheet 1 of 4

Borehole Log

SOCOTEC

Drilled	SS/MB	**Start**	16/04/2018
Logged	WH/PC		
Checked	TC	**End**	20/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.00	200	16.50
24.00	34.60	146	28.60

Ground Level	4.19 mOD
Coordinates (m)	E 516726.70
National Grid	N 417410.38

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
10.00 - 10.50	B 24			
10.50 - 10.95	UT 25	40 blows 100% rec	10.50	Dry
10.95 - 11.15	D 26			
11.15 - 11.60 11.15 - 11.60	SPTS D 27	N=24 (3,4/5,6,6,7)	10.50	Dry
11.50 - 12.00	B 28			
12.00 - 12.45 12.00 - 12.45	SPTS D 29	N=33 (4,4/6,7,9,11)	10.50	7.20
12.50 - 13.00	B 30			
13.50 - 13.95 13.50 - 13.95	SPTS D 31	N=37 (5,5/7,10,9,11)	13.50	2.10
14.00 - 15.00	B 32			
15.00 - 15.45 15.00 - 15.45	SPTS D 33	N=16 (3,3/4,3,4,5)	15.00	1.10
15.50 - 16.00	B 34			
16.50 - 16.95	SPTS	N=44 (6,8/7,11,13,13)	16.50	1.30
			17/04/18 16.50	1700 1.30
			18/04/18 16.50	0800 1.30
17.10 - 17.50	B 36			
18.00 - 18.45 18.00 - 18.45 18.00 - 19.00	SPTS D 37 B 38	N=13 (2,3/2,3,3,5)		
19.50 - 19.74 19.50 - 19.70	SPTS D 39			

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend
Stiff to very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.			
Brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk, sandstone and flint.	12.00-12.30 driller notes reddish brown fine sand 12.50 becomes light brown sandy	12.00 -7.81 (1.40)	3
Stiff to very stiff light yellowish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, sandstone and flint.	14.00-15.00 becoming slightly gravelly clayey sand 15.50-16.00 sandy clayey gravel	13.40 -9.21 (3.70)	4 5
Dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		17.10 -12.91 (0.70)	
Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		17.80 -13.61 (1.30)	5
Very stiff greyish brown slightly sandy slightly gravelly CLAY with pockets of coarse gravel size extremely weak weathered chalk. Gravel is subrounded fine to coarse of chalk.		19.10 -14.91	

Backfill

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
3	12.00	Rose to 6.95 m after 20 minutes.	12.30
4	13.40	Rose to 4.10 m after 20 minutes.	
5	17.80	Rose to 15.10 m after 20 minutes.	

Depth Related Remarks

Depths (m)	Remarks
13.50 - 16.50	Water added to assist boring.

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:23

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH4

Borehole Log

SOCOTEC

Drilled	SS/MB	**Start**	16/04/2018
Logged	WH/PC		
Checked	TC	**End**	
Approved	TC		20/04/2018

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.00	200	16.50
24.00	34.60	146	28.60

Ground Level	4.19 mOD
Coordinates (m)	E 516726.70
National Grid	N 417410.38

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
20.00 - 21.00	B 40			
21.00 - 21.22	SPTS			
21.00 - 21.25	D 41			
22.00 - 22.50	B 42			
22.50 - 22.64	SPTS	50 (18,7 for 10mm/50 for 60mm)		
22.50 - 22.60	D 43			
23.00 - 24.00	B 44			
			18/04/18 16.50	1700
24.00 - 24.15	SPTS	50 (25/50 for 60mm)	19/04/18 16.50	0800 0.85
24.00 - 24.15	D 45		19/04/18 16.50	0806 0.85

Depth	TCR SCR RQD	If	Records	Date Casing	Time Water
28.50 - 30.00	90 6 0	NI NI 80			

Strata Description

Main	Detail	Depth	Level	(Thickness)	Legend	Backfill
Very stiff greyish brown slightly sandy slightly gravelly CLAY with pockets of coarse gravel size extremely weak weathered chalk. Gravel is subrounded fine to coarse of chalk.	21.00-21.25 white chalk, possible cobble	21.40	-17.21	(2.30)		
Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk.		23.40	-19.21	(2.00)		
Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and flint.		24.00	-19.81	(0.60)		6
Stiff grey clay. (Rotary open hole drilling) (Drillers description)	24.00-24.15 light grey clayey silt	28.50	-24.31	(4.50)		
Medium strong to strong white CHALK. Fractures are: 1) subhorizontal, very closely spaced, undulating, rough with occasional grey staining. 2) subvertical, undulating, rough with occasional grey staining.	28.60-28.72 recovered as subangular gravel with rare angular flint 28.86-28.96 grey flint nodule 29.30-30.00 recovered as gravel 29.44-29.47 soft cream mottled greyish green clay with frequent angular fine gravel of chalk 30.00-30.27 AZCL			(2.15)		

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
6	24.00	Rose to 9.60 m after 20 minutes.	

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
21.40 - 21.90	40	
23.40 - 24.00	60	

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:23

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH4

Borehole Log

Drilled	SS/MB	**Start**	16/04/2018
Logged	WH/PC		
Checked	TC	**End**	
Approved	TC		20/04/2018

Equipment, Methods and Remarks

Dando 175. Beretta T44.
Cable percussion boring. Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.00	200	16.50
24.00	34.60	146	28.60

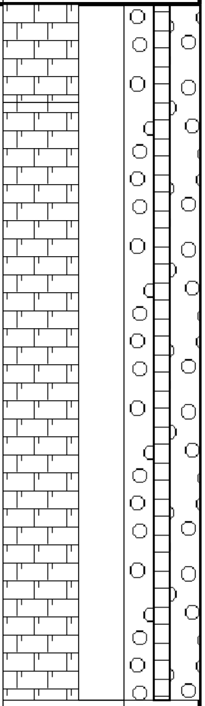
Ground Level	4.19 mOD
Coordinates (m)	E 516726.70
National Grid	N 417410.38

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
30.00 - 31.50	82 35 11			19/04/18 28.60	1700 0.85
31.50 - 32.10	47 12 0		Flush: 28.50 - 34.60 Air/ mist 100%	20/04/18 28.60	0800 1.00
32.10 - 33.10	100 46 19	NI 60 180			
33.10 - 34.10	100 44 15				
34.10 - 34.60	100 66 30			20/04/18 28.60	1700 1.00

Strata Description

Main	Detail	Depth, Level (Thickness)
Medium strong to strong white CHALK. Fractures are: 1) subhorizontal, very closely spaced, undulating, rough with occasional grey staining. 2) subvertical, undulating, rough with occasional grey staining.	30.27-30.37 recovered as subangular coarse gravel 30.51-30.57 recovered as subangular coarse gravel	30.65 -26.46
Strong white CHALK. Fractures are subhorizontal, very closely spaced, undulating, rough with brownish grey staining and rare infill of very soft greyish brown CLAY.	31.50-31.81 AZCL 32.42-32.46 recovered as subangular coarse gravel 32.64-32.75 recovered as subangular medium to coarse gravel including flint 32.77-33.00 subvertical undulating smooth fracture with clay infill 33.00-33.02 recovered as grey angular to subangular gravel of flint 33.40-33.42 rare subangular coarse gravel of flint 33.80-33.82 recovered as grey angular fine to medium gravel of flint	(3.95) 34.60 -30.41
END OF EXPLORATORY HOLE		



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed

Depth Related Remarks

Depths (m)	Remarks

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

14/08/2018 13:42:24

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH4

Sheet 4 of 4

Borehole Log

SOCOTEC

Drilled	GC	**Start**		
Logged	WH	17/04/2018		
Checked	TC	**End**		
Approved	TC	19/04/2018		

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	13.00	200	13.00
13.00	26.10	150	26.00

Ground Level	4.65 mOD
Coordinates (m)	E 516748.31
National Grid	N 417439.50

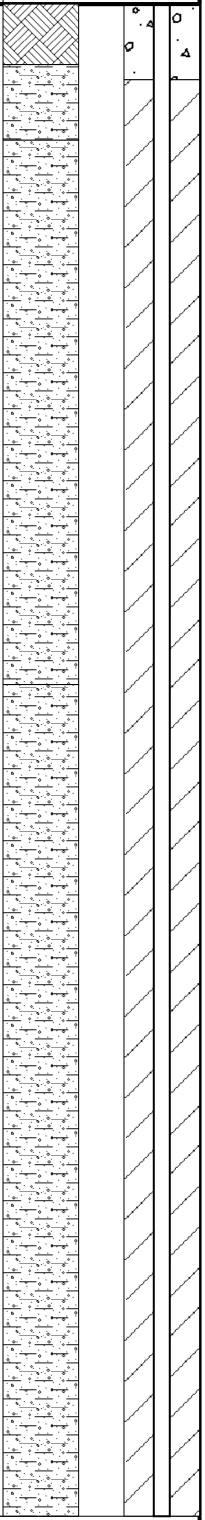
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
0.10	D 1	0.00-1.20 Hand excavated inspection pit.		
0.10 - 0.40	B 2			
0.50	D 3			
0.50 - 0.80	B 4			
1.00	D 5			
1.00 - 1.20	B 6			
1.20 - 1.65	UT 7	35 blows 89% rec		Dry
1.65 - 1.80	D 8			
1.80 - 2.25	SPTS	N=16 (2,3/3,4,4,5)		Dry
1.80 - 2.25	D 9			
1.80 - 2.25	B 10			
2.30 - 2.75	UT 11	38 blows 100% rec	1.70	Dry
2.75 - 2.90	D 12			
2.90 - 3.35	SPTS	N=19 (3,4/4,5,5,5)	1.70	Dry
2.90 - 3.35	D 13			
2.90 - 3.35	B 14			
3.40 - 3.85	UT 15	32 blows 100% rec	3.00	Dry
3.85 - 3.90	D 16			
4.00 - 4.45	SPTS	N=17 (2,3/4,4,4,5)	3.00	Dry
4.00 - 4.45	D 17			
4.00 - 4.45	B 18			
4.50 - 4.95	UT 20	40 blows 100% rec	4.40	Dry
4.50	D 19			
4.95 - 5.10	D 21			
5.10 - 5.55	SPTS	N=13 (2,2/3,3,3,4)	4.40	Dry
5.10 - 5.55	D 22			
5.10 - 5.55	B 22A			
6.50 - 6.95	UT 23	46 blows 100% rec	4.60	Dry
6.95 - 7.10	D 24			
7.10 - 7.55	SPTS	N=15 (2,3/3,4,4,4)	4.60	Dry
7.10 - 7.55	D 25			
7.10 - 7.55	B 26			
8.00 - 8.45	UT 27	60 blows 100% rec	4.60	Dry
8.45 - 8.60	D 28			
8.60 - 9.05	SPTS	N=29 (3,5/6,7,8,8)	4.60	Dry
8.60 - 9.05	D 29			
8.60 - 9.05	B 30			
9.50 - 9.95	UT 31	50 blows 100% rec	4.60	Dry
9.95 - 10.10	D 32			

Strata Description

Main	Detail	Depth, Level (Thickness)	
Dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone. (TOPSOIL)		(0.40)	
		0.40	+4.25
Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of flint.		(0.50)	
		0.90	+3.75
Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk, flint and mudstone.	2.90-4.45 gravel is subangular to subrounded	(3.60)	
		4.50	+0.15
Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine of chalk, sandstone and mudstone.		(7.90)	

Legend Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:24

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

BH5

Borehole Log

SOCOTEC

Drilled	GC	**Start**	
Logged	WH	17/04/2018	
Checked	TC	**End**	
Approved	TC	19/04/2018	

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	13.00	200	13.00
13.00	26.10	150	26.00

Ground Level	4.65 mOD
Coordinates (m)	E 516748.31
National Grid	N 417439.50

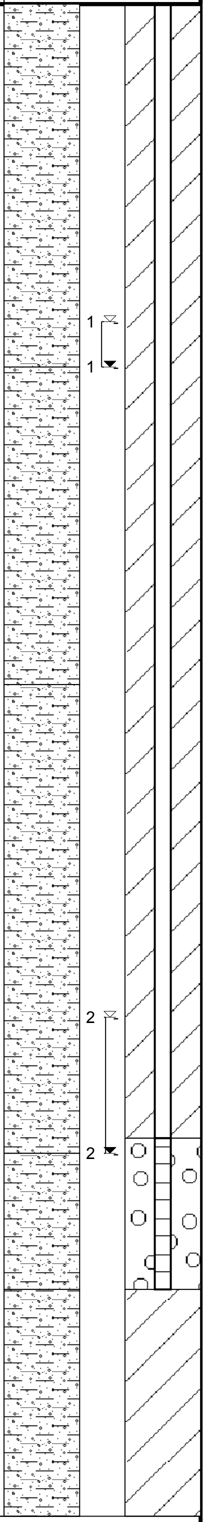
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
10.10 - 10.55	SPTS	N=30 (2,4/7,7,8,8)	4.60	Dry
10.10 - 10.55	D 33			
10.10 - 10.55	B 34			
11.00 - 11.45	UT 35	60 blows 100% rec	4.60	Dry
11.45 - 11.60	D 36			
11.60 - 12.05	SPTS	N=31 (4,6/7,7,8,9)	4.60	Dry
11.60 - 12.05	D 37			
11.60 - 12.05	B 38			
12.40	W 41			
12.50 - 12.95	SPTS	N=32 (4,6/7,7,8,10)	4.60	Dry
12.50 - 12.95	D 39			
12.50 - 12.95	B 40		17/04/18 4.60	1800 12.10
13.00	D 42		18/04/18 4.60	0800 2.00
14.00 - 14.45	UT 43	70 blows 100% rec	13.50	
14.45 - 14.60	D 44			
14.60 - 15.05	SPTS	N=46 (7,8/9,10,13,14)	13.50	
14.60 - 15.05	D 45			
14.60 - 15.05	B 46			
15.50 - 15.95	UT 47	100 blows 100% rec	15.00	
15.95 - 16.10	D 48			
16.10 - 16.48	SPTS	50 (8,10/13,18,19 for 75mm)	15.00	Dry
16.10 - 16.48	D 49			
16.10 - 16.48	B 50			
17.00 - 17.36	SPTS	50 (10,12/14,17,19 for 65mm)	15.00	Dry
17.00 - 17.36	D 51			
17.00 - 17.36	B 52			
17.70	D 53			
17.70 - 18.50	B 54			
18.50 - 18.86	SPTS	50 (11,13/15,18,17 for 65mm)	18.00	18.00
18.50 - 18.86	D 55			
18.50 - 18.86	B 56			

Strata Description

Main	Detail	Depth, Level (Thickness)
Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine of chalk, sandstone and mudstone.	11.45-12.05 dark brown, gravel is fine to medium	
Stiff light brown slightly sandy gravelly CLAY. Gravel is subrounded fine to medium of chalk, sandstone and mudstone.		12.40 -7.75 (2.10)
Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk and mudstone.	16.10 becoming light grey	14.50 -9.85 (3.10)
Very stiff light grey slightly sandy slightly gravelly CLAY with coarse gravel size pockets of extremely weak chalk. Gravel is subrounded fine to medium of chalk.		17.60 -12.95 (0.90)
Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.		18.50 -13.85

Legend **Backfill**



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	12.40	Rose to 12.10 m after 20 minutes. Slow inflow	
2	17.60	Rose to 16.70 m after 20 minutes. Medium inflow	18.00

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50 14/08/2018 13:42:24

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH5

Sheet 2 of 3

Borehole Log

SOCOTEC

Drilled	GC	**Start**	17/04/2018
Logged	WH		
Checked	TC	**End**	
Approved	TC		19/04/2018

Equipment, Methods and Remarks

Dando 2000.
Cable percussion boring.
SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	13.00	200	13.00
13.00	26.10	150	26.00

Ground Level	4.65 mOD
Coordinates (m)	E 516748.31
National Grid	N 417439.50

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
20.00 - 20.28 20.00 - 20.28 20.00 - 20.28	SPTS D 57 B 58	50 (12,13 for 55mm/20,30 for 75mm)	19.50	19.50
21.50 - 21.74 21.50 - 21.74 21.50 - 21.74	SPTS D 59 B 60	50 (20,5 for 15mm/26,24 for 70mm)	21.00	21.00
23.00 - 23.21 23.00 - 23.21 23.00 - 23.21	SPTS D 61 B 62	50 (18,2 for 20mm/30,20 for 40mm)	22.50	22.00
24.50 - 24.62 24.50 - 24.62 24.50 - 24.62	SPTS D 63 B 64	45 (25 for 20mm/33,12 for 25mm)	23.50	24.00
			18/04/18 25.00	1800 24.00
25.60 - 25.72 25.60 - 25.72	SPTS D 65	50 (25 for 50mm/50 for 70mm)	19/04/18 25.00	0800 21.00
26.10 - 26.15	SPTC	50 (25 for 20mm/50 for 30mm)	19/04/18 ~~26.00~~	1530 ~~23.00~~

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend	Backfill
Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	23.00-23.30 including gravel of sandstone	(7.65) 26.15 -21.50		
END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
25.40 - 25.60	60	Chisel
25.70 - 26.10	180	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:24

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH5

Sheet 3 of 3

Borehole Log

SOCOTEC

Drilled	SS/MB	**Start**	05/04/2018
Logged	MJS/IH		
Checked	TC	**End**	
Approved	TC	16/04/2018	

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.60	200	24.60
24.60	34.50	146	24.60

Ground Level	4.71 mOD
Coordinates (m)	E 516781.85
National Grid	N 417525.42

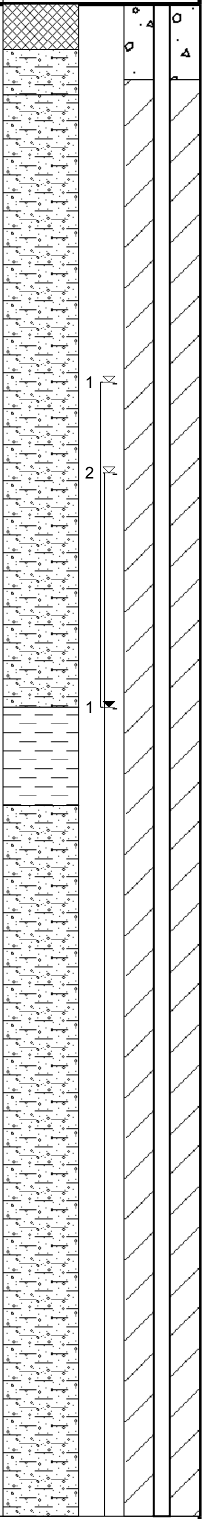
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
0.00 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.		
0.30 - 0.55	B 2			
0.55 - 1.20	B 3			
1.20 - 1.65 1.20 - 1.65	SPTS D 4	N=14 (1,2/2,4,4,4)	1.20	Dry
1.65 - 2.00	B 5			
2.00 - 2.45	UT 6	71 blows 100% rec	1.50	
2.45 - 2.65	D 7			
3.00 - 3.45 3.00 - 3.45	SPTS D 8	N=16 (3,4/3,4,4,5)	3.00	Dry
3.50 - 4.00	B 9			
4.00 - 4.45	UT 10	60 blows 100% rec	4.00	
4.45 - 4.65	D 11		05/04/18 4.00	1700 2.50
			06/04/18 4.00	0800 2.00
5.00 - 5.45 5.00 - 5.45	SPTS D 12	N=10 (1,1/1,2,3,4)	4.60	2.90
5.50 - 6.00	B 13			
6.00 - 6.45	UT 14	71 blows 100% rec	6.00	
6.45 - 6.65	D 15			
7.00 - 7.50	B 16			
7.50 - 7.95 7.50 - 7.95	SPTS D 17	N=18 (3,3/4,4,5,5)	7.50	Dry
8.00 - 9.00	B 18			
9.00 - 9.45	UT 19	61 blows 100% rec	9.00	
9.45 - 9.65	D 20			

Strata Description

Main	Detail	Depth, Level (Thickness)	
Greyish brown very sandy clayey GRAVEL. Gravel is angular to subrounded fine to coarse of mudstone, sandstone, chalk and brick. (MADE GROUND)		(0.30) 0.30	 +4.41
Firm brown, locally greyish brown, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone and sandstone.		(0.30) 0.60	 +4.11
Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of predominantly chalk, mudstone, quartz and sandstone and rare coal.		(4.05) 4.65	 +0.06
Firm thinly laminated CLAY with occasional partings of fine sand. Frequent gravel size pockets of fine to coarse sand.		(0.65) 5.30	 -0.59
Stiff to very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk, mudstone and sandstone.		(7.60)	

Legend Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	4.65	Rose to 2.50 m after 20 minutes.	5.30

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:25

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH6

Borehole Log

SOCOTEC

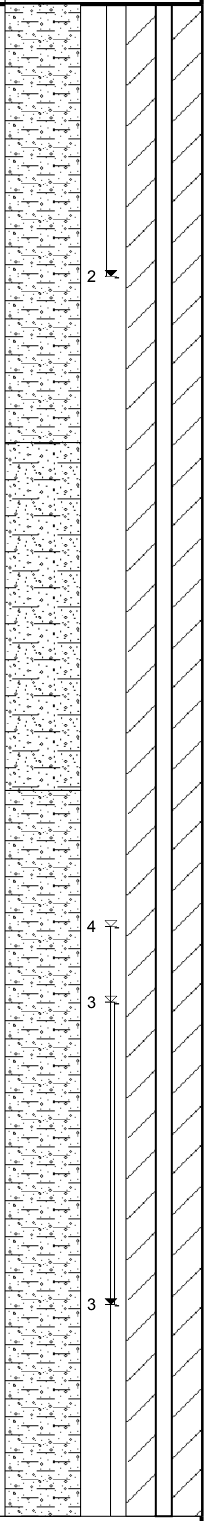
Drilled SS/MB	**Start**	**Equipment, Methods and Remarks**		**Ground Level** 4.71 mOD
Logged MJS/IH	05/04/2018	Dando 175./Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID AR2068, Rod type: 54mm Whitworth.		**Coordinates (m)** E 516781.85
Checked TC	**End**			**National Grid** N 417525.42
Approved TC	16/04/2018			

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.60	200	24.60
24.60	34.50	146	24.60

Samples and Tests / Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)
10.00 - 10.50	B 21				Stiff to very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk, mudstone and sandstone.		
10.50 - 10.95 10.50 - 10.95	SPTS D 22	N=18 (3,3/4,5,4,5)	10.50	Dry			
11.00 - 11.80	B 23						
12.00 - 12.45 12.00 - 12.45	SPTS D 24	N=21 (3,4/5,4,6,6)	12.00	4.10		11.80-12.00 occasional gravel size pockets of gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of chalk	
					Brown gravelly clayey fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of chalk and flint.		12.90 -8.19
13.00 - 13.50	B 25						
13.50 - 13.95	SPTS	N=4 (1,0/1,1,1,1)	13.50	9.10		13.50 SPT may be affected by groundwater disturbance at base of hole (piping)	
13.70	D 26						
14.00 - 15.00	B 27						(2.30)
			06/04/18 15.00	1630 9.10			
15.00 - 15.45 15.00 - 15.45	SPTS D 28	N=34 (6,6/7,9,10,8)					
			09/04/18 15.00	0800 10.40			
					Stiff to very stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of chalk and rare flint.		15.20 -10.49
15.50 - 16.50	B 29						
16.50 - 16.95	SPTS	N=28 (7,7/7,7,7,7)	16.50	14.10			
16.70	D 30						
17.50 - 18.00	B 31						
18.00 - 18.45 18.00 - 18.45	SPTS D 32	N=28 (6,7/6,7,7,8)	18.00	Dry			(6.30)
18.50 - 19.50	B 33						
19.50 - 19.95 19.50 - 19.95 19.50 - 21.00	SPTS D 34 B 35	N=39 (7,8/9,10,10,10)	19.50	Dry			

Legend Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
2	11.80	Rose to 3.10 m after 20 minutes.	
3	18.60	Rose to 16.60 m after 20 minutes.	18.70

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:42:25

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH6

Borehole Log

Drilled	SS/MB	**Start**	
Logged	MJS/IH	05/04/2018	
Checked	TC	**End**	
Approved	TC	16/04/2018	

Equipment, Methods and Remarks

Dando 175./Beretta T44.
Cable percussion boring./Rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.60	200	24.60
24.60	34.50	146	24.60

Ground Level	4.71 mOD
Coordinates (m)	E 516781.85
National Grid	N 417525.42

Samples and Tests

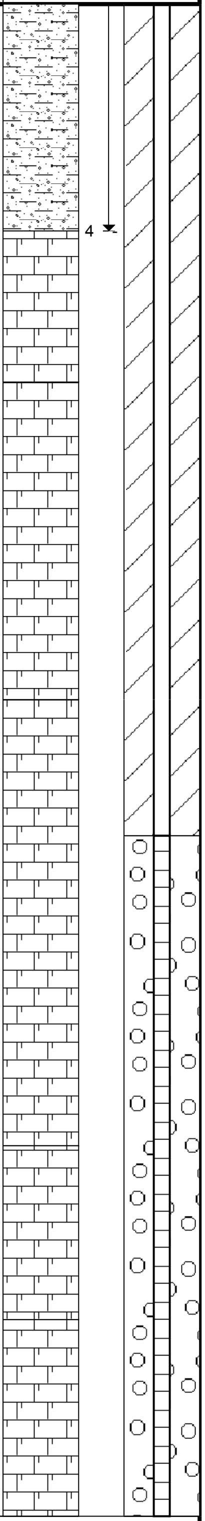
Depth	Type & No.	Records	Date Casing	Time Water
21.00 - 21.45 21.00 - 21.45	SPTS D 36	N=33 (4,5/5,9,9,10)	21.00	Dry
21.50 - 22.50	B 37			
22.50 - 22.95 22.50 - 22.95	SPTS D 38	N=44 (7,8/9,10,13,12)	22.00	13.00
			09/04/18 22.00	1700 13.00
23.00 - 23.80	B 39		10/04/18 22.00	0800 4.00
23.80 - 23.91	SPTC	50 (25 for 60mm/50 for 50mm)	22.50	4.00
24.25 - 24.30	SPTC	50 (25 for 30mm/50 for 20mm)	10/04/18 22.50	1010 4.00

Depth	TCR SCR RQD	If	Records	Date Casing	Time Water
24.60 - 25.60	95 46 30			13/04/18 22.50	0800 2.60
25.60 - 27.10	95 49 37	NI 100 196			
27.10 - 28.40	80 21 8	NI NI 90			
28.40 - 29.90	77 30 17	NI 120 170	Flush: 24.60 - 34.50 Air/ mist 100%		

Strata Description

Main	Detail	Depth, Level (Thickness)
Stiff to very stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of chalk and rare flint.		21.50 -16.79
Extremely weak cream CHALK. Recovered as gravelly clay.		(1.00) 22.50 -17.79
Very weak white, locally orangish brown, CHALK. Recovered as subangular fine to coarse gravel to cobbles.		(2.10) 24.60 -19.89
Weak cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, undulating, rough with dark brown staining. 2. Subvertical, planar, smooth with yellowish brown staining. 3. Incipient fractures are very closely spaced, stepped, striated.	26.85-26.98 1No. subangular cobble of flint 27.02-27.30 AZCL	(2.95) 27.55 -22.84
Weak cream, occasionally speckled black, CHALK. Recovered as slightly silty subangular fine to coarse gravel. Fractures are subhorizontal, closely spaced, undulating, rough with yellowish brown staining.	28.34-28.60 AZCL 28.55 rare subangular coarse gravel of flint	(1.15) 28.70 -23.99
Weak cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, planar, rough with dark greyish brown staining. 2. Occasionally subvertical, planar, smooth. 3. Incipient fractures are subhorizontal, extremely closely spaced, stepped, rough with occasional dark grey staining.	29.59-30.66 1No. cobble of flint 29.75-29.95 AZCL	(2.20)

Legend **Backfill**



Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
4	21.50	Rose to 16.10 m after 20 minutes.	

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used
23.80 - 24.25	60	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50 14/08/2018 13:42:25

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH6

Sheet 3 of 4

Borehole Log

Drilled	SS/MB	**Start**	05/04/2018
Logged	MJS/IH		
Checked	TC	**End**	16/04/2018
Approved	TC		

Equipment, Methods and Remarks

Dando 175. Beretta T44.
Cable percussion boring. Rotary core drilling (SWF size) using air mist flush.
SPT Hammer ID AR2068, Rod type: 54mm Whitworth.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	24.60	200	24.60
24.60	34.50	146	24.60

Ground Level	4.71 mOD
Coordinates (m)	E 516781.85
National Grid	N 417525.42

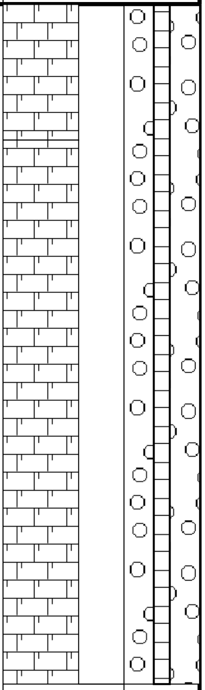
Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
29.90 - 31.40	97 63 40				
31.40 - 32.90	100 83 67	NI 150 310		13/04/18 24.60	1630 2.60
				16/04/18 24.60	1100 2.60
32.90 - 34.50	94 82 73			16/04/18 24.60	1300 0.70

Strata Description

Main	Detail	Depth, Level (Thickness)
Weak cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, planar, rough with dark greyish brown staining. 2. Occasionally subvertical, planar, smooth. 3. Incipient fractures are subhorizontal, extremely closely spaced, stepped, rough with occasional dark grey staining.		30.90 -26.19
Weak to medium strong cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, undulating, rough and planar, rough with dark grey staining. 2. Rare 45 degree, undulating, rough with dark grey staining. 3. Incipient fractures are subhorizontal, very closely to closely spaced, undulating, striated, stepped, rough.	30.90-33.80 dark grey staining is possible mudstone partings (<5mm thick) 32.90-34.50 rare angular to subangular fine to coarse gravel of flint, rare incipient fractures are closely spaced 33.80-33.89 1No. cobble of chalk and flint conglomerate	(3.60) 34.50 -29.79
END OF EXPLORATORY HOLE		

Legend **Backfill**



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed

Depth Related Remarks

Depths (m)	Remarks

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50 14/08/2018 13:42:25

AGS

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

BH6

Borehole Log

Drilled	MB	**Start**	06/04/2018
Logged	IH		
Checked	TC	**End**	06/04/2018
Approved	TC		

Equipment, Methods and Remarks

Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	3.60	87	
3.60	4.60	55	

Ground Level	6.49 mOD
Coordinates (m)	E 516506.21
National Grid	N 417414.94

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 0.50	D 2				
0.00 - 0.50	B 1				
0.25	HV		p 120kPa, r N/A		
0.50	HV		p 120kPa, r N/A		
0.50 - 1.20	D 4				
0.50 - 1.20	B 3				
1.00	HV		p 120kPa, r N/A		
1.20 - 1.65	SPTS		N=10 (2,2/2,2,3,3)		
1.20 - 1.65	D 5				
1.20 - 1.70	B 7				
1.20 - 2.00	L		100% rec, diameter 87mm		
1.30 - 1.50	D 6				
1.80 - 2.00	D 8				
2.00 - 2.45	SPTS		N=26 (3,5/4,5,8,9)		
2.00 - 2.20	D 10				
2.00 - 2.45	D 9				
2.00 - 2.80	B 12				
2.00 - 2.80	L		100% rec, diameter 87mm		
2.30 - 2.50	D 11				
2.80 - 3.25	SPTS		N=20 (4,4/4,4,5,7)		
2.80 - 3.25	D 13				
2.80 - 3.60	L		100% rec, diameter 87mm		
3.00 - 3.20	D 14				
3.40 - 3.60	D 15				
3.60 - 4.05	SPTS		N=20 (4,5/4,4,5,7)		
3.60 - 3.80	D 16				
3.60 - 4.05	D 17				
3.60 - 4.60	L		75% rec, diameter 55mm		
4.20 - 4.40	D 18				
4.50 - 4.60	D 19				
4.60 - 5.05	SPTS		N=16 (3,3/3,4,4,5)		
4.60 - 5.05	D 20				
				06/04/18	1200

Strata Description

Main	Detail	Depth, Level (Thickness)
Dark brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular to rounded fine to medium, rarely coarse, of chalk and mudstone with occasional concrete, quartz and flint. Cobbles are subangular of chalk. (MADE GROUND)	0.50 rare rootlets	(0.50) 0.50 +5.99
Dark brown, locally mottled black, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, mudstone and rare flint. Strong hydrocarbon odour. (MADE GROUND)		(0.90) 1.40 +5.09
Firm reddish brown, occasionally mottled red, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk and mudstone with occasional flint and rare sandstone.		(0.35) 1.75 +4.74
Firm grey, mottled brown, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk and mudstone with occasional flint and rare sandstone.		(0.25) 2.00 +4.49
Firm to stiff indistinctly laminated reddish brown, mottled grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk and mudstone with occasional flint and rare sandstone.	2.10 unknown fibrous rock/material 2.40 occasional pockets of reddish pink clayey fine sand	(1.60) 3.60 +2.89
Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to medium of chalk.		(0.60) 4.20 +2.29
Brown fine to medium SAND.	4.50-4.60 brown slightly gravelly fine to coarse sand. Gravel is subangular to well rounded fine to medium of chalk and rare quartz	(0.40) 4.60 +1.89
Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to medium of chalk.		(0.45) 5.05 +1.44
END OF EXPLORATORY HOLE		

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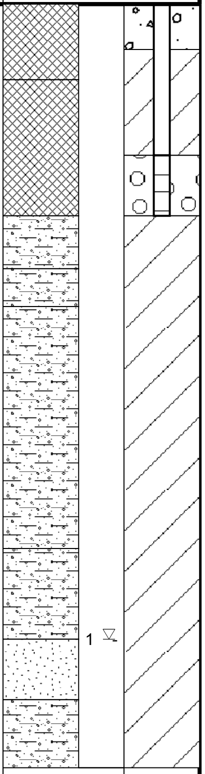


Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed
1	4.20		

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:47:31

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

WS1

Sheet 1 of 1

Borehole Log

Drilled	MB	**Start**	10/04/2018
Logged	IH		
Checked	TC	**End**	10/04/2018
Approved	TC		

Equipment, Methods and Remarks

Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	1.70	87	
1.70	2.50	77	
2.50	3.30	67	

Ground Level	5.46 mOD
Coordinates (m)	E 516529.35
National Grid	N 417368.31

Samples and Tests

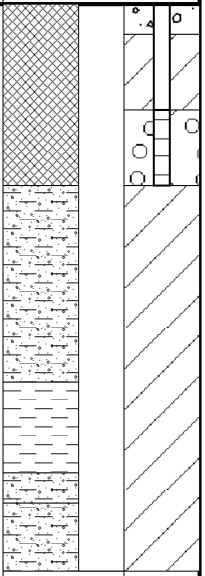
Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 0.50	D 2				
0.00 - 0.50	B 1				
0.25	HV		p 120kPa, r N/A		
0.50	HV		p 120kPa, r N/A		
0.50 - 1.20	D 4				
0.50 - 1.20	B 3				
1.00	HV		p 120kPa, r N/A		
1.20 - 1.65	SPTS		N=16 (2,2/3,3,5,5)		
1.20 - 1.40	D 5				
1.20 - 1.65	D 6				
1.20 - 1.70	B 8				
1.20 - 1.70	L		100% rec, diameter 87mm		
1.50 - 1.70	D 7				
1.70 - 2.15	SPTS		N=28 (3,3/5,8,7,8)		
1.70 - 2.15	D 9				
1.70 - 2.50	B 11				
1.70 - 2.50	L		100% rec, diameter 77mm		
2.20 - 2.40	D 10				
2.40 - 2.50	D 12				
2.50 - 2.95	SPTS		N=22 (2,4/4,5,6,7)		
2.50 - 2.95	D 13				
2.50 - 3.10	B 16				
2.50 - 3.30	L		100% rec, diameter 67mm		
2.85 - 3.10	D 14				
3.10 - 3.30	D 15				
3.30 - 3.75	SPTS		N=26 (3,5/5,5,8,8)		
3.30 - 3.75	D 17				
				10/04/18	1100

Strata Description

Main	Detail	Depth	Level	(Thickness)
Brown, mottled orange and grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of mudstone and sandstone. Strong oil/hydrocarbon odour. (MADE GROUND)	0.50 rare angular to subrounded fine to medium gravel of flint and sandstone with rare chalk	1.20	+4.26	(1.20)
Firm orangish brown, mottled grey, slightly sandy slightly gravelly CLAY with rare rootlets. Gravel is subangular to subrounded fine to medium of chalk and mudstone with rare flint.	1.50-2.50 indistinctly laminated 2.30 gravel size pocket of dark grey fine sand	2.50	+2.96	(1.30)
Firm indistinctly laminated dark brown, mottled grey, CLAY.	2.85-3.10 gravel size pockets of fine sand	3.10	+2.36	(0.60)
Firm yellowish dark brown, mottled grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of chalk, flint and sandstone.		3.30	+2.16	(0.20)
Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.		3.75	+1.71	(0.45)

END OF EXPLORATORY HOLE

Legend **Backfill**



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.
0.00 - 3.75	No groundwater encountered during drilling.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:47:32

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

WS2

Sheet 1 of 1

Borehole Log

SOCOTEC

Drilled	MB	**Start**	
Logged	IH	10/04/2018	
Checked	TC	**End**	
Approved	TC	10/04/2018	

Equipment, Methods and Remarks

Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	2.00	87	
2.00	3.00	77	
3.00	4.00	67	

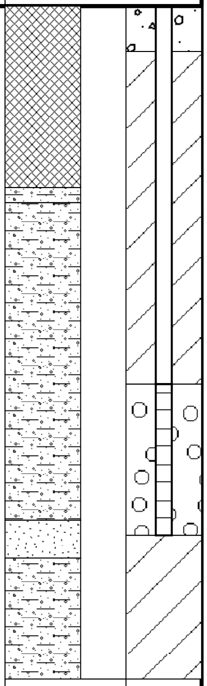
Ground Level	5.52 mOD
Coordinates (m)	E 516555.69
National Grid	N 417360.77

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 1.20	D 2				
0.00 - 1.20	B 1				
1.20 - 1.65	SPTS		N=11 (2,2/2,2,3,4)		
1.20 - 1.30	D 3				
1.20 - 1.65	D 4				
1.20 - 2.00	L		100% rec, diameter 87mm		
1.30 - 2.00	B 6				
1.50 - 1.70	D 5				
2.00 - 2.45	SPTS		N=23 (3,5/6,5,6,6)		
2.00 - 2.20	D 7				
2.00 - 2.45	D 8				
2.00 - 3.00	L		100% rec, diameter 77mm		
2.30 - 3.00	B 10				
2.80 - 3.00	D 9				
3.00 - 3.45	SPTS		N=14 (4,5/4,3,3,4)		
3.00 - 3.45	D 11				
3.00 - 4.00	L		40% rec, diameter 67mm		
3.40 - 3.65	D 12				
3.65 - 3.80	D 13				
4.00 - 4.45	SPTS		N=20 (2,3/5,4,5,6)		
				10/04/18	0000

Strata Description

Main	Detail	Depth, Level (Thickness)
Brown, mottled black and grey and rarely orangish brown, slightly sandy slightly gravelly CLAY with frequent roots and wood fragments. Gravel is subangular to rounded fine to medium of chalk and mudstone with occasional concrete. 1No. angular cobble of chalk. (MADE GROUND)		(1.20) 1.20 +4.32
Soft, becoming firm, orangish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to medium of mudstone and flint with rare chalk.		(0.10) 1.30 +4.22
Firm to stiff brown, mottled grey and rarely black, slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of chalk and flint with rare sandstone.	2.05-2.55 indistinctly laminated 2.30 becoming with no gravel 2.55 becoming thinly laminated	(2.10) 3.40 +2.12
Brown fine to coarse SAND.		(0.25) 3.65 +1.87
Firm brown, mottled grey, sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of chalk.		(0.80) 4.45 +1.07
END OF EXPLORATORY HOLE		



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.
0.00 - 1.00	Material too granular for hand vane testing.
0.00 - 4.45	No groundwater encountered during drilling.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:47:32

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

WS3

Sheet 1 of 1

Borehole Log

Drilled	MB	**Start**	06/04/2018
Logged	IH		06/04/2018
Checked	TC	**End**	
Approved	TC		06/04/2018

Equipment, Methods and Remarks
Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	2.00	87	
2.00	3.00	77	
3.00	3.60	57	

Ground Level	5.10 mOD
Coordinates (m)	E 516586.01
National Grid	N 417401.62

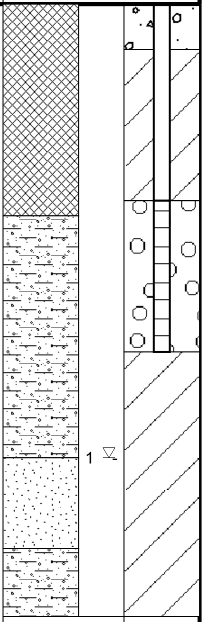
Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 0.50	D 2				
0.00 - 0.50	B 1				
0.25	HV		p 120kPa, r N/A		
0.50	HV		p 120kPa, r N/A		
0.50 - 1.20	D 4				
0.50 - 1.20	B 3				
1.00	HV		p 120kPa, r N/A		
1.20 - 1.65	SPTS		N=19 (2,3/4,5,5,5)		
1.20 - 1.40	D 5				
1.20 - 1.65	D 6				
1.20 - 2.00	B 8				
1.20 - 2.00	L		100% rec, diameter 87mm		
1.60 - 1.80	D 7				
2.00 - 2.45	SPTS		N=22 (3,4/5,5,6,6)		
2.00 - 2.20	D 10				
2.00 - 2.45	D 9				
2.00 - 3.00	L		75% rec, diameter 77mm		
2.40 - 2.60	D 11				
2.80 - 3.00	D 12				
3.00 - 3.45	SPTS		N=20 (2,3/4,5,5,6)		
3.00 - 3.20	D 13				
3.00 - 3.45	D 14				
3.00 - 3.50	B 16				
3.00 - 3.60	L		83% rec, diameter 57mm		
3.50 - 3.60	D 15				
3.60 - 4.05	SPTS		N=15 (3,3/3,4,4,4)		
3.60 - 4.05	D 17				
				06/04/18	1500

Strata Description

Main	Detail	Depth, Level (Thickness)
Brown, occasionally mottled grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and mudstone with rare flint and occasional rootlets. (MADE GROUND)	0.50 dark brown	(1.40)
Firm brown, occasionally mottled grey and rarely reddish brown, slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk and mudstone with rare sandstone and flint.	1.35-1.40 layer of brick, recovered as subangular medium to coarse gravel 1.60 pocket of sandy clay (30mm diameter) 2.00-2.40 sandy 2.40 indistinctly laminated 2.70 thinly laminated	1.40 +3.70 (1.60)
Medium dense orangish brown fine to coarse SAND.	3.50-3.60 brown slightly clayey fine to medium sand	3.00 +2.10 (0.60)
Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to medium of chalk and mudstone.		3.60 +1.50 (0.45)
END OF EXPLORATORY HOLE		4.05 +1.05

Legend **Backfill**



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed
1	3.00		

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:47:32

Project	VPI IMMINGHAM
Project No.	A8015-18
Carried out for	AECOM

Borehole

WS4

Sheet 1 of 1

Borehole Log

SOCOTEC

Drilled	MB	**Start**	10/04/2018
Logged	IH		10/04/2018
Checked	TC	**End**	
Approved	TC		10/04/2018

Equipment, Methods and Remarks

Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	2.00	87	
2.00	3.00	77	
3.00	5.00	67	

Ground Level	4.70 mOD
Coordinates (m)	E 516626.81
National Grid	N 417337.47

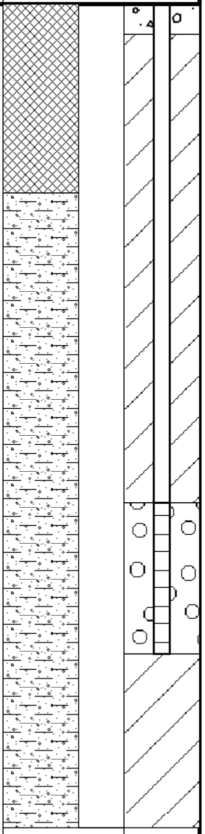
Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 1.20	D 2				
0.00 - 1.20	B 1				
0.25	HV		p 110kPa, r N/A		
0.50	HV		p 100kPa, r N/A		
1.00	HV		p 100kPa, r N/A		
1.20 - 1.65	SPTS		N=9 (1,2/2,2,2,3)		
1.20 - 1.25	D 3				
1.20 - 1.65	D 4				
1.20 - 2.00	L		100% rec, diameter 87mm		
1.25 - 1.80	B 7				
1.50 - 1.70	D 5				
1.80 - 2.00	D 6				
2.00 - 2.45	SPTS		N=20 (3,4/5,4,5,6)		
2.00 - 2.45	D 8				
2.00 - 3.00	B 11				
2.00 - 3.00	L		88% rec, diameter 77mm		
2.20 - 2.40	D 9				
2.80 - 3.00	D 10				
3.00 - 3.45	SPTS		N=24 (3,4/5,6,6,7)		
3.00 - 3.20	D 12				
3.00 - 3.45	D 13				
3.00 - 4.00	L		85% rec, diameter 67mm		
3.75 - 3.85	D 14				
4.00 - 4.45	SPTS		N=23 (4,4/4,5,6,8)		
4.00 - 4.45	D 15				
4.00 - 5.00	L		Diameter 67mm		
5.00 - 5.45	SPTS		N=19 (4,4/4,4,5,6)		
5.00 - 5.45	D 16				
				10/04/18	1300

Strata Description

Main	Detail	Depth, Level (Thickness)
Firm dark brown, mottled grey and black, slightly sandy slightly gravelly CLAY with low cobble content and occasional rootlets. Gravel is subangular to subrounded fine to coarse of mudstone, chalk, sandstone and occasional brick fragments. Cobble is subangular of chalk. (MADE GROUND)	1.20 soft	(1.25) 1.25 +3.45
Firm, becoming stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to well rounded fine to coarse of mudstone with occasional sandstone and flint.	1.80 brown mottled grey. Gravel is chalk and occasional mudstone 2.35-5.45 indistinctly laminated 2.65-5.45 rare gravel 3.35-5.45 soft, gravelly. Gravel is subangular to subrounded fine to medium of chalk and mudstone with rare sandstone and flint 3.40 dark brown 3.75 firm 4.00-4.45 occasional gravel size pockets of sand	(4.20) 5.45 -0.75
END OF EXPLORATORY HOLE		

Legend **Backfill**



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.
0.00 - 5.45	No groundwater encountered during drilling.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50 14/08/2018 13:47:33

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

WS5

Sheet 1 of 1

Borehole Log

SOCOTEC

Drilled	MB	**Start**	11/04/2018
Logged	WH		11/04/2018
Checked	TC	**End**	
Approved	TC		11/04/2018

Equipment, Methods and Remarks
Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	3.00	87	
3.00	4.00	77	
4.00	5.00	67	

Ground Level	5.69 mOD
Coordinates (m)	E 516668.52
National Grid	N 417414.78

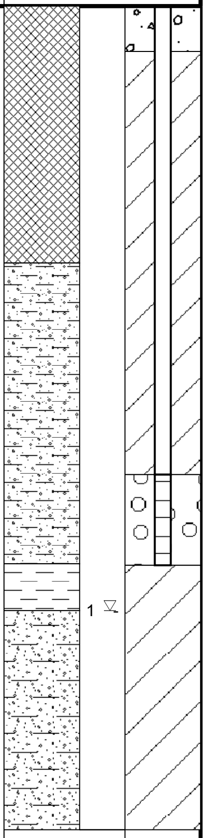
Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 1.20	B 1				
0.25	HV		p 90kPa, r N/A		
0.50	HV		p 90kPa, r N/A		
0.60	D 2				
1.00	HV		p 90kPa, r N/A		
1.20 - 1.65	SPTS		N=8 (1,1/3,1,1,3)		
1.20 - 1.65	D 3				
1.20 - 2.00	L		94% rec, diameter 87mm		
1.30 - 1.70	B 5				
1.50	D 4				
1.70 - 2.00	B 7				
1.80	D 6				
2.00 - 2.45	SPTS		N=22 (3,3/4,6,5,7)		
2.00 - 2.45	D 8				
2.00 - 3.00	B 10				
2.00 - 3.00	L		100% rec, diameter 87mm		
2.50	D 9				
2.80 - 3.25	SPTS		N=21 (4,4/5,4,6,6)		
2.80 - 3.25	D 11				
3.00 - 3.60	B 13				
3.00 - 4.00	L		100% rec, diameter 77mm		
3.50	D 12				
3.80 - 4.25	SPTS		N=29 (5,8/8,7,7,7)		
3.80	D 14				
3.80 - 4.25	D 15				
4.00 - 5.00	L		70% rec, diameter 67mm		
4.30 - 5.00	B 17				
4.50	D 16				
5.00 - 5.45	SPTS		N=19 (4,4/5,4,5,5)		
				11/04/18	1100

Strata Description

Main	Detail	Depth, Level (Thickness)
Brown sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone and sandstone. (MADE GROUND)	1.20-1.30 1No. subrounded cobble of chalk 1.40-1.50 dark greyish brown clay	(1.70) 1.70 +3.99
Firm to stiff brown, occasionally mottled grey, slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of chalk, flint and sandstone.		(1.99) 3.69 +2.00
Soft brown CLAY	3.69-3.80 light brown fine to coarse sand pocket	(0.31) 4.00 +1.69
Medium dense light brown gravelly slightly clayey fine to coarse SAND with rare pockets of gravelly clay. Gravel is subangular coarse of sandstone.		(1.45) 5.45 +0.24
END OF EXPLORATORY HOLE		

Legend **Backfil**



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed
1	4.00		

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50
14/08/2018 13:47:33

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

WS6

Sheet 1 of 1

Borehole Log

SOCOTEC

Drilled	MB	**Start**		
Logged	WH	11/04/2018		
Checked	TC	**End**		
Approved	TC	11/04/2018		

Equipment, Methods and Remarks

Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	3.00	87	
3.00	4.00	77	
4.00	5.00	67	

Ground Level	5.79 mOD
Coordinates (m)	E 516708.48
National Grid	N 417492.50

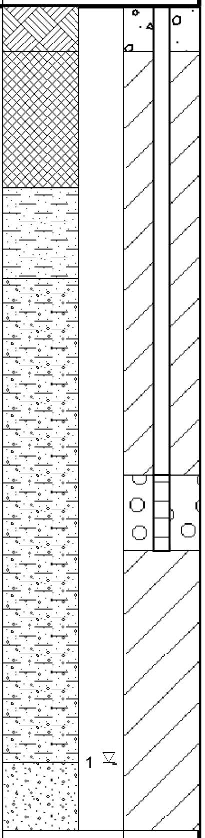
Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 0.30	B 1				
0.20	D 2				
0.30 - 0.80	B 3				
0.50	D 4				
0.80 - 1.20	B 5				
0.90	D 6				
1.20 - 1.65	SPTS		N=6 (3,3/2,2,1,1)		
1.20 - 1.65	D 7				
1.20 - 1.80	B 9				
1.20 - 2.00	L		100% rec, diameter 87mm		
1.50	D 8				
1.80 - 2.00	B 11				
1.90	D 10				
2.00 - 2.45	SPTS		N=19 (3,4/4,4,5,6)		
2.00 - 2.45	D 12				
2.00 - 3.00	L		80% rec, diameter 87mm		
2.40 - 3.00	B 14				
2.80	D 13				
3.00 - 3.45	SPTS		N=23 (4,5/5,6,6,6)		
3.00 - 3.45	D 15				
3.00 - 4.00	L		40% rec, diameter 77mm		
3.60 - 4.00	B 17				
3.80	D 16				
4.00 - 4.45	SPTS		N=23 (5,5/5,6,6,6)		
4.00 - 4.45	D 18				
4.00 - 5.00	L		90% rec, diameter 67mm		
4.60 - 5.00	B 20				
4.90	D 19				
5.00 - 5.45	SPTS		N=18 (5,5/5,4,5,4)		
5.00 - 5.45	D 21			11/04/18	1300

Strata Description

Main	Detail	Depth, Level (Thickness)
Brown slightly gravelly sandy CLAY with rootlets and low cobble content. Gravel is subangular fine to coarse of chalk and sandstone. Cobbles are subrounded of chalk. (TOPSOIL)		(0.30) 0.30 +5.49
Light brown sandy gravelly CLAY with low cobble content. Gravel is subangular fine to coarse of sandstone. Cobbles are subrounded of chalk. (MADE GROUND)	0.50-0.70 pockets of dark greyish brown clay	(0.90) 1.20 +4.59
Soft greyish brown slightly sandy CLAY with rare subrounded fine to medium gravel of chalk.		(0.60) 1.80 +3.99
Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	4.80-4.85 soft brown clay	(3.20) 5.00 +0.79
Medium dense light brown gravelly fine to coarse SAND. Gravel is subrounded coarse of igneous rock and chalk.		(0.45) 5.45 +0.34
END OF EXPLORATORY HOLE		

Legend Backfill



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed
1	5.00		

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.
0.00 - 1.00	Material too granular for hand vane testing.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50 14/08/2018 13:47:33

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

WS7

Sheet 1 of 1

Borehole Log

Drilled	MB	**Start**	
Logged	WH	11/04/2018	
Checked	TC	**End**	
Approved	TC	11/04/2018	

Equipment, Methods and Remarks

Archway Dart.
Dynamic sampling.
SPT Hammer ID: DART235, Rod type: quick thread.

Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)
1.20	2.00	87	
2.00	3.00	77	
3.00	4.00	67	

Ground Level	4.53 mOD
Coordinates (m)	E 516813.22
National Grid	N 417461.78

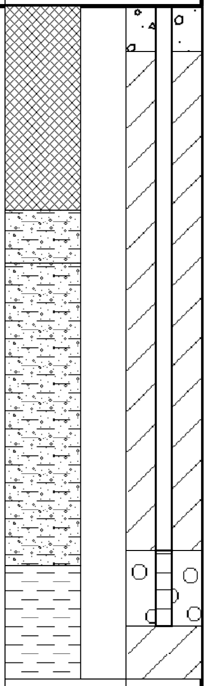
Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
0.00 - 1.20	B 1				
0.25	HV		p 120kPa, r N/A		
0.50	HV		p 120kPa, r N/A		
0.60	D 2				
1.00	HV		p 120kPa, r N/A		
1.20 - 1.65	SPTS		N=12 (1,1/3,3,3,3)		
1.20 - 1.65	D 3				
1.20 - 2.00	L		100% rec, diameter 87mm		
1.35 - 1.70	B 5				
1.50	D 4				
1.70	D 6				
1.70 - 2.00	B 7				
2.00 - 2.45	SPTS		N=18 (3,4/4,4,5,5)		
2.00 - 2.45	D 8				
2.00 - 3.00	L		40% rec, diameter 77mm		
2.70	D 9				
2.70 - 3.00	B 10				
3.00 - 3.45	SPTS		N=12 (3,3/3,2,3,4)		
3.00 - 3.45	D 11				
3.00 - 4.00	L		30% rec, diameter 67mm		
3.70	D 12				
4.00 - 4.45	SPTS		N=14 (3,3/3,3,4,4)		
4.00 - 4.45	D 13				
				11/04/18	1500

Strata Description

Main	Detail	Depth, Level (Thickness)		
Brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is subangular fine to medium of sandstone. (MADE GROUND)				(1.35)
Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk and sandstone.		1.35	+3.18	(0.35)
Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		1.70	+2.83	(2.00)
Soft brown CLAY.		3.70	+0.83	(0.75)
END OF EXPLORATORY HOLE		4.45	+0.08	

Legend Backfil



Groundwater Entries

No.	Depth Strike	Remarks	Depth Sealed

Depth Related Remarks

Depths (m)	Remarks
0.00 - 1.20	Hand excavated inspection pit.
0.00 - 4.45	No groundwater encountered during drilling.

Chiselling Details

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:50

14/08/2018 13:47:34

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Borehole

WS8

Sheet 1 of 1

Trial Pit Log

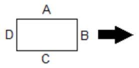
SOCOTEC

Logged WH	**Start** 11/04/2018	**Equipment, Methods and Remarks**	**Ground Level** 6.33 mOD
Checked TC	**End** 11/04/2018	Tracked 360 excavator. Machine excavated.	**Coordinates (m)** E 516544.31
Approved TC			**National Grid** N 417427.12

Dimension and Orientation

Width 0.60 m

Length 4.00 m



270 (Deg)

Samples and Tests

Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.30	D1 B2		Dark brown sandy clayey subangular to subrounded fine to coarse GRAVEL of sandstone, chalk, clinker, macadam and slag with low cobble content. Cobbles are subrounded to subangular of concrete and chalk. (MADE GROUND)		(0.50) 0.50 +5.83		
0.70 0.70 - 0.90	D3 B4		Firm dark greyish brown, mottled black, slightly sandy gravelly CLAY. Gravel is subangular to subrounded of brick, clinker, sandstone, flint and chalk. Strong oil/hydrocarbon odour. (MADE GROUND)		(0.60) 1.10 +5.23		
1.20 1.20 1.20 - 1.50	HV D5 B6	p 120kPa, r N/A	Stiff brown, mottled grey, slightly sandy gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		(1.40) 2.50 +3.83		
2.00 2.00 2.00 - 2.20	HV D7 B8	p 120kPa, r N/A					
3.40 - 3.60 3.50	B10 D9	11/04/18 Dry	Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of predominantly chalk with sandstone.		(1.40) 3.90 +2.43		
			END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks

Remarks

Depth (m)	Remarks
0.00 - 3.90	No groundwater encountered during excavation.

Stability Stable

Shoring None

Weather Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:48:23

AGS

Project **VPI IMMINGHAM**

Project No. **A8015-18**

Carried out for **AECOM**

Trial Pit

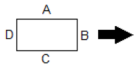
TP1

Sheet 1 of 1

Trial Pit Log

SOCOTEC

Logged WH **Checked** TC **Approved** TC	**Start** 11/04/2018 **End** 11/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator. Machine excavated.	**Dimension and Orientation** Width 0.60 m Length 4.00 m 270 (Deg)



Ground Level	5.70 mOD
Coordinates (m)	E 516559.56
National Grid	N 417394.29

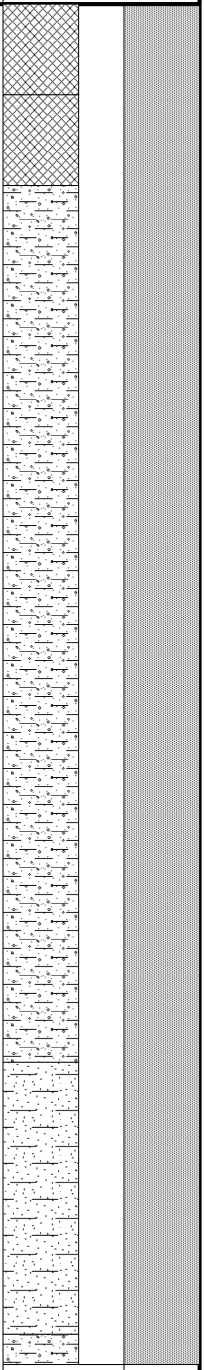
Samples and Tests

Depth	Type & No.	Records
0.10 - 0.30	B2	
0.20	D1	
0.30	D3	
0.30 - 0.50	B4	
1.30	HV	p 120kPa, r N/A
1.30	D5	
1.30 - 1.50	B6	
2.30 - 2.50	B8	
2.50	D7	
3.10	HV	p 120kPa, r N/A
3.40	D9	
3.40 - 3.50	B10	
4.00	D11	
4.00 - 4.20	B12	
		11/04/18 Dry
4.40	HV	p 120kPa, r N/A
4.40	D13	
4.40 - 4.50	B14	

Strata Description

Main	Detail	Depth, Level (Thickness)
Soft dark brown slightly gravelly sandy CLAY with low cobble content and rootlets. Gravel is subangular to subrounded fine to coarse of chalk, flint, sandstone and debris including metal bolts, wood and concrete. Cobbles are subrounded of chalk. (MADE GROUND)		(0.30) 0.30 +5.40
Firm dark brown, mottled black, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, sandstone and flint. Strong oil/hydrocarbon odour. (MADE GROUND)		(0.30) 0.60 +5.10
Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of predominantly chalk with sandstone and flint. Cobbles are subrounded of chalk.	0.60-0.90 firm light brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, sandstone and flint 3.20-3.50 becoming grey with less gravel	(2.90) 3.50 +2.20
Light brown clayey, locally very clayey, fine to medium SAND.		(0.90) 4.40 +1.30
Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk.		(0.10) 4.50 +1.20
END OF EXPLORATORY HOLE		

Legend / Backfill



Groundwater Entries

No.	Depth Strike (m)	Remarks

Remarks

Depth (m)	Remarks
0.00 - 4.50	No groundwater encountered during excavation.
0.00 - 3.50	Material too friable for hand vane testing.

Stability Stable

Shoring None

Weather Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:48:24

AGS

Project **VPI IMMINGHAM**

Project No. **A8015-18**

Carried out for **AECOM**

Trial Pit

TP2

Sheet 1 of 1

Trial Pit Log

Logged WH **Checked** TC **Approved** TC	**Start** 10/04/2018 **End** 10/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator. Machine excavated.	**Dimension and Orientation** Width 0.60 m Length 4.00 m A B C D 340 (Deg)	**Ground Level** 4.41 mOD **Coordinates (m)** E 516568.48 **National Grid** N 417297.43

Samples and Tests

Depth	Type & No.	Records
0.10	D1	
0.10 - 0.20	B2	
0.50	HV	p 120kPa, r N/A
0.50	D3	
0.50 - 0.80	B4	
1.80	D5	
1.80 - 2.00	B6	
2.50	HV	p 120kPa, r N/A
2.50	D7	
2.50 - 2.80	B8	
3.40	D9	
3.40 - 3.60	B10	
4.00	D11	
4.00 - 4.20	B12	
		10/04/18 Dry

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend	Backfill
Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to subrounded fine to medium of sandstone, chalk and flint. (MADE GROUND)		(0.20) 0.20 +4.21		
Firm light brown, mottled grey, slightly sandy gravelly CLAY with low cobble content. Gravel is subrounded fine to medium of predominantly chalk with sandstone and mudstone. Cobbles are subrounded of flint and chalk.	0.20-0.40 light brown, mottled orangish brown	(2.30) 2.50 +1.91		
Firm brown CLAY.		(0.30) 2.80 +1.61		
Dark brown slightly clayey fine to coarse SAND.		(0.80) 3.60 +0.81		
Soft dark brown very sandy CLAY with occasional gravel size pockets of sand.		(0.90) 4.50 -0.09		
END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks

Remarks

Depth (m)	Remarks
0.00 - 4.50	No groundwater encountered during excavation.

Stability	Face A and E collapsed from 2.80m
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:48:24

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TP3

Sheet 1 of 1

Trial Pit Log

SOCOTEC

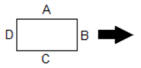
Logged	WH	**Start**	09/04/2018
Checked	TC	**End**	10/04/2018
Approved	TC		

Equipment, Methods and Remarks

Tracked 360 excavator
Machine excavated pit

Dimension and Orientation

Width 0.60 m
Length 4.00 m



290 (Deg)

Ground Level	4.47 mOD
Coordinates (m)	E 516556.55
National Grid	N 417325.06

Samples and Tests

Depth	Type & No.	Records
0.10 0.10 - 0.30	D1 B2	09/04/18
0.80 0.80 - 1.00	D3 B4	
1.40 1.40 1.40 - 1.60	HV D5 B6	p 120kPa, r N/A
3.00 3.00 - 3.20	D7 B8	
3.40	B10	
3.50	D9	
4.00 4.00 - 4.30	D11 B12	
		10/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)		
Dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to subrounded fine to medium of sandstone, chalk and flint. (MADE GROUND)		0.30	+4.17	(0.30)
Firm brown, mottled light grey, slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of predominantly chalk with sandstone, mudstone and flint.	1.10 land drain	1.40	+3.07	(1.10)
Firm brown, mottled light grey, CLAY.	2.60-3.00 grey mottled brown 3.00-3.40 brown slightly gravelly clayey sand. Gravel is subangular fine to coarse of chalk	3.40	+1.07	(2.00)
Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, flint and sandstone.		4.50	-0.03	(1.10)
END OF EXPLORATORY HOLE				

Legend: 1 ▽ (1.10)

Backfill

Groundwater Entries

No.	Depth Strike (m)	Remarks
1	1.10	Seepage

Remarks

Depth (m)	Remarks

Stability	Stable
Shoring	None
Weather	overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:48:24

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

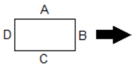
TP4

Sheet 1 of 1

Trial Pit Log

SOCOTEC

Logged WH **Checked** TC **Approved** TC	**Start** 10/04/2018 **End** 10/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator. Machine excavated.	**Dimension and Orientation** Width 0.60 m Length 4.00 m 120 (Deg)



Ground Level	4.31 mOD
Coordinates (m)	E 516595.86
National Grid	N 417316.85

Samples and Tests

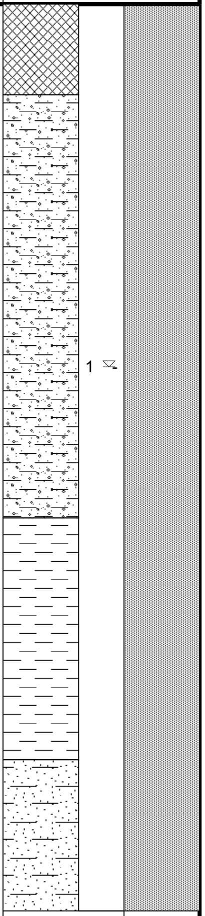
Depth	Type & No.	Records
0.10	D1	
0.10 - 0.20	B2	
0.50	HV	p 120kPa, r N/A
0.50	D3	
0.50 - 0.70	B4	
1.50	HV	p 120kPa, r N/A
1.50	D5	
1.50 - 1.70	B6	
2.00	D7	
2.00 - 2.20	B8	
2.50	D9	
2.50 - 2.70	B10	
		10/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)	
Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to subrounded fine to medium of sandstone, chalk and flint. (MADE GROUND)		(0.30) 0.30	+4.01
Firm brown, mottled grey, gravelly slightly sandy CLAY with low cobble content. Gravel is subrounded fine to medium of chalk, flint and mudstone. Cobbles are subangular of chalk.	0.60-0.90 soft light yellowish brown slightly sandy clay 1.20 land drain	(1.40) 1.70	+2.61
Stiff bluish grey, mottled brown, CLAY.		(0.80) 2.50	+1.81
Light brown slightly clayey to clayey fine to medium SAND. Rare angular fine gravel of mudstone.		(0.50) 3.00	+1.31

END OF EXPLORATORY HOLE

Legend **Backfill**



Groundwater Entries

No.	Depth Strike (m)	Remarks
1	1.20	Seepage

Remarks

Depth (m)	Remarks

Stability	Faces A and C collapsed
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:48:24

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TP5

Sheet 1 of 1

Trial Pit Log

Logged WH **Checked** TC **Approved** TC	**Start** 10/04/2018 **End** 10/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator. Machine excavated.	**Dimension and Orientation** Width 0.60 m Length 4.00 m A, B, C, D 240 (Deg)	**Ground Level** 5.43 mOD **Coordinates (m)** E 516601.66 **National Grid** N 417379.51

Samples and Tests

Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.30	D1 B2		Dark brown slightly gravelly clayey SAND with medium cobble content. Gravel is subangular fine to coarse of clinker, chalk and macadam. Cobbles are subrounded of chalk. (MADE GROUND)		(0.30)		
					0.30 +5.13		
0.40 - 0.60	B4		Firm dark brown, mottled orangish brown, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk and flint. (MADE GROUND)		(0.30)		
0.50	D3						
			Firm light brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of flint, chalk, mudstone and sandstone.	0.60-1.20 brown mottled grey gravelly clay	0.60 +4.83		
1.00 1.00 - 1.20	D5 B6						
				1.20 land drain			
1.50	HV	p 120kPa, r N/A					
						1	
2.00	HV	p 120kPa, r N/A					
					(3.50)		
2.50 2.50 - 3.00	D7 B8						
4.10 4.10 - 4.30	D9 B10		Firm dark brown sandy CLAY with occasional gravel size pockets of sand.		4.10 +1.33		
					(0.50)		
		10/04/18					
			END OF EXPLORATORY HOLE		4.60 +0.83		

Groundwater Entries

No.	Depth Strike (m)	Remarks
1	1.90	Seepage

Remarks

Depth (m)	Remarks

Stability	Stable
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25 14/08/2018 13:48:25

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TP6

Sheet 1 of 1

Trial Pit Log

SOCOTEC

Logged	WH	**Start** 10/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator. Machine excavated.	**Dimension and Orientation** Width 0.60 m Length 4.00 m A B C D 140 (Deg)	**Ground Level**	5.29 mOD
Checked	TC				**Coordinates (m)**	E 516616.25
Approved	TC	**End** 10/04/2018			**National Grid**	N 417423.18

Samples and Tests

Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30 0.20	B2 D1		Soft brown sandy slightly gravelly CLAY with frequent rootlets. Gravel is subrounded fine to medium of chalk. (TOPSOIL)		(0.30) 0.30 +4.99		
1.30 1.30 1.30 - 1.60	HV D3 B4	p 120kPa, r N/A	Soft brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of chalk sandstone and flint.	1.10 soft orangish brown sandy clay 1.10 land drain	(2.60) 2.90 +2.39	1	
3.50 3.50 - 3.80	D5 B6		Brown clayey fine to coarse SAND.		(0.90) 3.80 +1.49		
4.00 4.00 - 4.20	D7 B8	10/04/18	Firm dark greyish brown CLAY.		(0.40) 4.20 +1.09		
			END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks
1	1.10	Seepage

Remarks

Depth (m)	Remarks

Stability	Faces A and C collapsed from 2.90m
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:25

14/08/2018 13:48:25

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TP7

Sheet 1 of 1

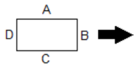
Trial Pit Log

SOCOTEC

Logged	WH	**Start**	10/04/2018
Checked	TC	**End**	10/04/2018
Approved	TC		

Equipment, Methods and Remarks
Tracked 360 excavator.
Machine excavated.

Dimension and Orientation
Width 0.60 m
Length 4.00 m



35 (Deg)

Ground Level	4.60 mOD
Coordinates (m)	E 516678.60
National Grid	N 556494.03

Samples and Tests

Depth	Type & No.	Records
0.10	D1	
0.10 - 0.20	B2	
0.20	HV	p 120kPa, r N/A
0.20	D3	
0.20 - 0.50	B4	
0.80	HV	p 120kPa, r N/A
0.80	D5	
0.80 - 1.00	B6	
2.00	D7	
2.00 - 2.20	B8	
3.10	D9	
3.10 - 3.30	B10	
3.70 - 3.90	B12	
3.80	D11	
4.00	HV	p 100kPa, r N/A
4.00	D13	
4.00 - 4.50	B14	
		10/04/18 Dry

Strata Description

Main	Detail	Depth, Level (Thickness)
Soft dark brown silty CLAY with rootlets. (TOPSOIL)		(0.20) 0.20 +4.40
Light orangish brown slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse of sandstone and chalk. (MADE GROUND)		(0.30) 0.50 +4.10
Firm brown, mottled light grey, slightly sandy gravelly CLAY with low cobble content. Gravel is subrounded to rounded fine to coarse of chalk and sandstone. Cobbles are subrounded of chalk.		(2.50) 3.00 +1.60
Soft light grey, mottled brown, CLAY with rare subrounded fine to medium gravel of chalk.	3.20-3.90 firm dark brown clay	(0.30) 3.30 +1.30
Dark brown clayey fine to medium SAND with occasional gravel size pockets of sandy clay.		(0.60) 3.90 +0.70
Firm brown slightly sandy silty CLAY.		(0.60) 4.50 +0.10
END OF EXPLORATORY HOLE		

Legend **Backfill**

Groundwater Entries

No.	Depth Strike (m)	Remarks

Remarks

Depth (m)	Remarks
0.00 - 4.50	No groundwater encountered during excavation.

Stability Stable
Shoring None
Weather Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25 14/08/2018 13:48:25

AGS

Project **VPI IMMINGHAM**
Project No. **A8015-18**
Carried out for **AECOM**

Trial Pit
TP8
Sheet 1 of 1

Trial Pit Log

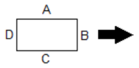
SOCOTEC

Logged	WH
Checked	TC
Approved	TC

Start 10/04/2018
End 10/04/2018

Equipment, Methods and Remarks
Tracked 360 excavator.
Machine excavated.

Dimension and Orientation
Width 0.60 m
Length 4.00 m



310 (Deg)

Ground Level	5.71 mOD
Coordinates (m)	E 516677.98
National Grid	N 417410.00

Samples and Tests

Depth	Type & No.	Records
0.10	D1	
0.10 - 0.20	B2	
0.30	D3	
0.30 - 0.40	B4	
0.80	D5	
0.80 - 1.00	B6	
1.60	HV	p 120kPa, r N/A
1.60	D7	
1.60 - 1.80	B8	
2.00	D9	
2.00 - 2.20	B10	
3.20	D11	
3.20 - 3.40	B12	
		10/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)		Legend	Backfill
Soft dark brown slightly gravelly slightly silty CLAY with frequent rootlets. Gravel is angular to subrounded fine to medium of sandstone and flint. (TOPSOIL)		(0.20) 0.20	+5.51		
Light yellowish brown very sandy clayey angular to subangular fine to coarse GRAVEL of limestone and sandstone. (MADE GROUND)		(1.40) 1.60	+4.11	1	
Stiff dark orangish brown, mottled dark brown, CLAY with rare subangular fine gravel of flint.		(0.40) 2.00	+3.71		
Stiff light brown, mottled grey, slightly gravelly sandy CLAY. Gravel is subangular fine to coarse of chalk.		(2.20) 4.20	+1.51		
END OF EXPLORATORY HOLE					

Groundwater Entries

No.	Depth Strike (m)	Remarks
1	0.70	Seepage

Remarks

Depth (m)	Remarks

Stability	Faces A and C collapsed from 0.20 to 4.20m
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:48:25

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TP9

Sheet 1 of 1

Trial Pit Log

SOCOTEC

Logged	WH	**Start**	06/04/2018
Checked	TC	**End**	06/04/2018
Approved	TC		

Equipment, Methods and Remarks
Tracked 360 excavator.
Machine excavated.

Dimension and Orientation
Width 0.60 m
Length 3.00 m
A B C D 230 (Deg)

Ground Level	4.70 mOD
Coordinates (m)	E 516725.56
National Grid	N 417441.68

Samples and Tests

Depth	Type & No.	Records
0.10 - 0.40	B2	
0.30	D1	
0.40	HV	p 120kPa, r N/A
0.40	D3	
0.40 - 0.60	B4	
0.80	HV	p 120kPa, r N/A
0.90	D5	
0.90 - 1.20	B6	
2.20	D7	
2.20 - 2.70	B8	
3.00	D9	
3.20 - 3.70	B10	
4.20	D11	
4.20 - 4.50	B12	
		06/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend
Soft light brown, mottled greyish brown, slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to rounded of chalk and mudstone. (TOPSOIL)		(0.40) 0.40 +4.30	
Firm dark greyish brown, mottled dark grey, slightly sandy CLAY with frequent wood and plant material.		(0.40) 0.80 +3.90	
Firm light orangish brown, mottled light grey, slightly sandy gravelly CLAY. Gravel is subangular to subrounded of predominantly chalk with mudstone and flint.	1.00-1.20 light yellowish brown sand pockets	(2.20) 3.00 +1.70	1
Firm dark brown CLAY with rare subrounded fine to medium gravel of mudstone.		(1.00) 4.00 +0.70	
Greyish brown slightly gravelly clayey fine to coarse SAND. Gravel is subrounded fine to medium of mudstone.		(0.50) 4.50 +0.20	
END OF EXPLORATORY HOLE			

Groundwater Entries

No.	Depth Strike (m)	Remarks
1	1.00	Seepage

Remarks

Depth (m)	Remarks

Stability	Stable
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25 14/08/2018 13:48:26

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

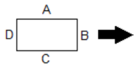
TP10

Sheet 1 of 1

Trial Pit Log

SOCOTEC

Logged WH **Checked** TC **Approved** TC	**Start** 09/04/2018 **End** 09/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator. Machine excavated.	**Dimension and Orientation** Width 0.60 m Length 4.00 m 220 (Deg)



Ground Level	6.44 mOD
Coordinates (m)	E 516698.32
National Grid	N 417407.31

Samples and Tests

Depth	Type & No.	Records
0.10	D1	
0.10 - 0.30	B2	
0.50	HV	p 120kPa, r N/A
0.50	D3	
0.50 - 0.70	B4	
1.70	D5	
1.70	D6	
2.20	HV	p 100kPa, r N/A
2.20	D7	
2.20 - 2.30	B8	
2.50	D9	
2.50 - 2.70	B10	
3.40	D11	
3.50 - 3.70	B12	
		09/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)
Soft brown slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of chalk, brick, sandstone and concrete. (MADE GROUND)		(0.50) 0.50 +5.94
Firm brown, mottled light grey, slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, flint and sandstone.	0.50 concrete block wider than trench on Face D 1.40 low cobble content. Cobbles are subrounded of chalk	(1.60) 2.10 +4.34
Firm dark greyish brown, mottled dark grey, slightly gravelly slightly sandy to sandy CLAY. Gravel is subrounded fine to coarse of sandstone.		(0.30) 2.40 +4.04
Firm light brown, mottled light grey, locally light orange brown, slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of chalk.		(1.00) 3.40 +3.04
Stiff light brown, mottled grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of sandstone and chalk.	4.10 locally slightly sandy gravelly clay	(1.10) 4.50 +1.94
END OF EXPLORATORY HOLE		

Legend / Backfill: 1 ▽ (at 1.50)

Groundwater Entries

No.	Depth Strike (m)	Remarks
1	1.50	Seepage

Remarks

Depth (m)	Remarks

Stability	Stable
Shoring	None
Weather	Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

AGS

Scale 1:25

14/08/2018 13:51:53

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TT1

Sheet 1 of 1

Trial Pit Log

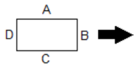
SOCOTEC

Logged WH
Checked TC
Approved TC

Start 06/04/2018
End 06/04/2018

Equipment, Methods and Remarks
Wheeled 360 excavator.
Machine excavated.
Top strata too friable to do hand vane.

Dimension and Orientation
Width 0.60 m
Length 4.00 m



160 (Deg)

Ground Level 5.22 mOD
Coordinates (m) E 516764.39
National Grid N 417439.42

Samples and Tests

Depth	Type & No.	Records
0.00 - 0.25	B2	
0.25	D1	
1.00	D3	
1.00 - 1.25	B4	
2.00	HV	p 70kPa, r N/A
2.00	D5	
2.00 - 2.15	B6	
3.00	HV	p 120kPa, r N/A
3.00	D7	
3.00 - 3.20	B8	
3.25	HV	p 120kPa, r N/A
3.25	D9	Dry
3.25 - 3.50	B10	06/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend	Backfill
Soft light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded of flint and sandstone. Occasional rootlets. (MADE GROUND)		(3.00) 3.00 +2.22	▩	▒
Dark greyish brown, mottled light brown, CLAY with rare angular to subrounded fine to medium gravel of various lithologies including flint and quartzite.		(0.25) 3.25 +1.97	▤	▒
Firm light brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of flint and mudstone.		(0.25) 3.50 +1.72	▦	▒
END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks

Remarks

Depth (m)	Remarks
0.00 - 3.50	No groundwater encountered during excavation.

Stability Stable
Shoring None
Weather Overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:51:53

AGS

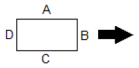
Project **VPI IMMINGHAM**
Project No. **A8015-18**
Carried out for **AECOM**

Trial Pit
TT2
Sheet 1 of 1

Trial Pit Log

SOCOTEC

Logged WH **Checked** TC **Approved** TC	**Start** 05/04/2018 **End** 06/04/2018	**Equipment, Methods and Remarks** Tracked 360 excavator Machine excavated pit	**Dimension and Orientation** Width 0.60 m Length 4.00 m 230 (Deg)



Ground Level	5.40 mOD
Coordinates (m)	E 516764.82
National Grid	N 417461.85

Samples and Tests

Depth	Type & No.	Records
		05/04/18
0.30 0.30 - 0.60	D1 B2	
1.30 1.30 - 1.60	D3 B4	
2.10 2.10 2.10 - 2.50	HV D5 B6	p 120kPa, r N/A
		06/04/18

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend	Backfill
Brown, locally light brown, slightly sandy CLAY with low cobble content. Cobbles are subrounded of flint and sandstone.		(1.40) 1.40 +4.00		
Dark greyish brown silty CLAY with occasional wood fragments. Slight organic odour.		(0.60) 2.00 +3.40		
Firm light brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone, chalk and quartzite.		(0.50) 2.50 +2.90		
END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks

Remarks

Depth (m)	Remarks
0.00 - 2.00	Material too friable for hand vane testing.
0.00 - 2.50	No groundwater encountered during excavation.

Stability Stable

Shoring None

Weather overcast

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

14/08/2018 13:51:54

AGS

Project	**VPI IMMINGHAM**
Project No.	**A8015-18**
Carried out for	**AECOM**

Trial Pit

TT3

Sheet 1 of 1

APPENDIX C

INSTRUMENTATION AND MONITORING

Installation Details	Table C1

Installation Details

Instrument Reference	Instrument Type (See Notes)	Installation Date, dd/mm/yyyy	Pipe Diameter, mm	Instrument Base, mbgl	Response Zone Range, mbgl	Pipe Top Details	Headworks	Remarks
BH1 (1)	SP	11/04/2018	50	14.80	12.60 to 15.00	Gas tap	Raised cover	
BH2 (1)	SP	16/04/2018	50	15.10	14.00 to 15.20	Gas tap	Flush cover	
BH3 (1)	SP	18/04/2018	50	28.60	26.60 to 28.60	Gas tap	Flush cover	
BH4 (1)	SP	20/04/2018	50	34.60	28.60 to 34.60	Gas tap	Flush cover	
BH5 (1)	SP	19/04/2018	50	18.50	17.50 to 18.50	Gas tap	Flush cover	
BH6 (1)	SP	16/04/2018	50	34.50	25.50 to 34.50	Gas tap	Raised cover	
WS1 (1)	SP	06/04/2018	50	1.40	1.00 to 1.40	Gas tap	Raised covers	
WS2 (1)	SP	10/04/2018	50	1.20	0.70 to 1.20	Gas tap	Raised cover	
WS3 (1)	SP	10/04/2018	50	3.50	2.50 to 3.50	Gas tap	Raised cover	
WS4 (1)	SP	06/04/2018	50	2.30	1.30 to 2.30	Gas tap	Raised cover	
WS5 (1)	SP	10/04/2018	50	4.30	3.30 to 4.30	Gas tap	Raised cover	
WS6 (1)	SP	11/04/2018	50	3.70	3.10 to 3.70	Gas tap	Raised cover	
WS7 (1)	SP	11/04/2018	50	3.60	3.10 to 3.60	Gas tap	Raised cover	
WS8 (1)	SP	11/04/2018	50	4.10	3.60 to 4.10	Gas tap	Raised cover	

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well

AGS

Project VPI IMMINGHAM

Project No. A8015-18

Carried out for AECOM

Table

C1

APPENDIX D

GEOTECHNICAL LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX 1 to 3
Particle Size Distribution Analyses	PSD 1 to 24
Unconsolidated Undrained Triaxial Compression Tests – Summary of Results	UUSUM
Consolidated Undrained Triaxial Compression Tests with Measurement of Pore Water Pressure	CUM 1 to 6 (3 sheets per test)
One Dimensional Consolidation Test	OED 1 to 8
Determination of Consolidation Properties Using a Hydraulic Cell	HC 1 and 3 (2 sheets per test)
Dry Density / Moisture Content Relationship (Light)	COMPL 1 to 7
Dry Density / Moisture Content Relationship (Heavy)	COMPH 1 to 9
California Bearing Ratio	CBR 1 to 11
Chemical Tests	EFS/187041 EFS/187043 EFS/187204 EFS/187902

INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	p	p_d	w	< 425 µm sieve	W_L	W_P	I_P	p_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3		%	%	%	%		Mg/m3	
BH1	4	0.50	0.70	B	Greyish brown slightly sandy slightly gravelly silty CLAY.			27	91	54 a	26	28		
BH1	8	2.00	2.45	D	Brown slightly sandy slightly gravelly CLAY.			14	92	43 a	19	24		
BH1	9	2.50	3.00	B	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.								2.71-p	
BH1	17	6.50	6.95	D	Brown slightly sandy slightly gravelly CLAY.			13	82	33 a	15	18		
BH1	22	9.50	9.95	D	Brown slightly sandy slightly gravelly CLAY.			14	88	29 a	15	14		
BH1	27	13.00	13.50	B	Brown slightly gravelly sandy silty CLAY.								2.68-p	
BH1	35	17.00	17.45	UT	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is mainly chalk.								2.72-p	
BH1	36	17.45	17.60	D	Dark grey sandy gravelly CLAY.			13	82	30 a	15	15		
BH1	40	20.40	20.50	D	Grey slightly sandy gravelly CLAY.			22						
BH1	43	22.50	22.70	D	Grey slightly sandy slightly gravelly CLAY. Gravel contains chalk fragments.			13						
BH1	46	25.00	25.22	D	Grey slightly gravelly sandy CLAY. Gravel is chalk fragments.			13	89	27 a	15	12		
BH2	2	0.30	0.50	B	Brown slightly sandy gravelly CLAY.			20	56	44 a	22	22		
BH2	5	1.00		D	Brown slightly sandy slightly gravelly CLAY.			22						
BH2	8	1.65	1.80	D	Brown slightly sandy slightly gravelly CLAY.			24	91	42 a	19	23		
BH2	15	3.30	3.75	UT	Firm laminated brown slightly sandy CLAY.			23	100	47 a	22	25		
BH2	28	5.10	5.55	UT	Firm dark brown slightly sandy slightly gravelly CLAY.			16	83	32 a	17	15	2.70-p	
BH2	34	7.10	7.55	D	Brown slightly sandy slightly gravelly CLAY.			18	88	33 a	14	19		
BH2	40	9.50	9.95	UT	Firm bown slightly sandy slightly gravelly silty CLAY. Gravel is chalk fragments.			14	87	32 a	13	19		
BH2	51	13.10	13.55	B	Brown slightly sandy slightly gravelly silty CLAY. Gravel is chalk.			16	89	31 a	15	16		
BH2	63	18.50	19.00	B	Greenish grey slightly sandy SILT.			22	100	23 a	NP			
BH3	3	1.65	2.00	B	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.			28	95	37 a	21	16	2.71-p	
BH3	8	4.00	4.45	D	Brown slightly gravelly very sandy silty CLAY.			21						
BH3	12	5.65	6.00	B	Brown slightly sandy slightly gravelly CLAY.			18	85	32 a	15	17	2.70-p	
BH3	19	9.00	9.45	UT	Firm greyish brown slightly sandy slightly gravelly silty CLAY. Gravel contains chalk fragments.			17						
BH3	27	12.00	12.45	UT	Firm brown slightly sandy slightly gravelly CLAY.			17						
BH3	32	13.50	13.95	D	Light brown silty SAND.			25						
BH3	45	23.00	24.00	B	Greenish grey CLAY with chalk fragments.			15						
BH4	1	0.50	1.20	B	Brown slightly sandy slightly gravelly CLAY.			24	95	43 a	21	22		
BH4	7	3.10	3.55	UT	Brown slightly sandy SILT.			21						
BH4	10	4.50	4.95	UT	Firm to stiff greyish brown slightly sandy slightly gravelly CLAY.								2.70-p	
BH4	14	6.00	6.45	UT	Firm brown slightly sandy slightly gravelly CLAY.			14	89	33 a	14	19		

General notes: All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : p bulk density, linear
pd dry density
w moisture content
* test carried out to BS EN ISO 17892-1 2014

WL Liquid limit
a 4 point cone test
b 1 point cone test

WP Plastic limit
NP non - plastic
IP Plasticity Index

<425um preparation
n from natural soil
s sieved specimen

ps particle density
-g = gas jar
-p = small pyknometer

QA Ref
SLR 1
Rev 2.91
Mar 17

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

INDX

Printed: 31/07/2018 12:05

INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample No.	Sample Depth (m) from	Sample Depth (m) to	Sample type	Soil Description	p	pd	w	< 425 µm sieve	WL	WP	IP	ps	Remarks
						Mg/m3		%	%	%	%		Mg/m3	
BH4	22	9.00	9.45	UT	Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel contains chalk fragments.			15	89	32 a	15	17		
BH4	27	11.15	11.60	D	Brown slightly sandy slightly gravelly CLAY.			12						
BH4	34	15.50	16.00	B	Light brown gravelly SAND.			8.6						
BH4	42	22.00	22.50	B	Grey slightly sandy slightly gravelly CLAY. Gravel is chalk fragments.			17						
BH5	3	0.50		D	Brown slightly sandy slightly gravelly CLAY.			16	96	39 a	19	20		
BH5	11	2.30	2.75	UT	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is chalk fragments.			16					2.71-p	
BH5	20	4.50	4.95	UT	Firm laminated brown slightly gravelly sandy CLAY.			17	88	27 a	16	11		
BH5	27	8.00	8.45	UT	Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel contains chalk.			16	82	30 a	14	16		
BH5	35	11.00	11.45	UT	Firm brown slightly sandy slightly gravelly CLAY.			16						
BH5	42	13.00		D	Soft brown slightly gravelly, slightly sandy CLAY.			15						
BH5	51	17.00	17.36	D	Light grey sandy gravelly CLAY.			1.7						
BH5	58	20.00	20.28	B	Greenish grey CLAY with chalk fragments.			4.9						
BH6	1	0.00	0.30	B	Brown very sandy clayey GRAVEL.			20						
BH6	6	2.00	2.45	UT	Very stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel contains chalk.								2.71-p	
BH6	9	3.50	4.00	B	Brown slightly silty CLAY.			27						
BH6	14	6.00	6.45	UT	Firm to stiff greyish brown slightly gravelly sandy CLAY. Gravel contains chalk.			15	90	29 a	18	11		
BH6	21	10.00	10.50	B				17						
BH6	25	13.00	13.50	B	Brown slightly sandy slightly gravelly CLAY.			16					2.65-g	
BH6	28	15.00	15.45	D	Light brown sandy gravelly CLAY.			16						
BH6	35	19.50	21.00	B	Greyish brown gravelly CLAY. Gravel is chalk fragments.			17						
TP1	4	0.70	0.90	B	Brown slightly sandy CLAY with occasional chalk fragments.			26						
TP1	8	2.00	2.20	B	Brown slightly sandy slightly gravelly CLAY.			20	96	47 a	19	28	2.69-p	
TP10	8	2.20	2.70	B	Brown slightly sandy slightly gravelly CLAY.			22	95	41 a	19	22		
TP10	12	4.20	4.50	B	Brown SAND.			21						
TP2	1	0.20		D	Dark brown slightly sandy slightly gravelly CLAY.			25						
TP2	8	2.30	2.50	B	Brown slightly sandy slightly gravelly CLAY.			11	94	45 a	19	26		
TP2	12	4.00	4.20	B	Brown slightly gravelly silty SAND.			25					2.72-p	
TP2	13	4.40		D	Brownish grey slightly gravelly sandy CLAY.			16	88	32 a	17	15		
TP3	10	3.40	3.60	B	Light brown SAND.			25					2.69-p	
TP3	12	4.00	4.20	B	Brown very clayey SAND with chalk fragments.			21	92	23 a	14	9		
TP4	4	0.80	1.00	B	Brown slightly sandy CLAY with chalk fragments.			17	94	42 a	17	25		

General notes: All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : p bulk density, linear

pd dry density

w moisture content

* test carried out to BS EN ISO 17892-1 2014

WL Liquid limit

a 4 point cone test

b 1 point cone test

WP Plastic limit

NP non - plastic

IP Plasticity Index

<425um preparation

n from natural soil

s sieved specimen

ps particle density

-g = gas jar

-p = small pyknometer

QA Ref
SLR 1
Rev 2.91
Mar 17

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

INDX

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INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	p	p_d	w	< 425 µm sieve	W_L	W_P	I_P	p_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3		%	%	%	%		Mg/m3	
TP4	12	4.00	4.30	B	Brown slightly sandy slightly gravelly CLAY.			18	93	39 a	17	22		
TP5	6	1.50	1.70	B	Brown slightly sandy CLAY with chalk fragments.			24	98	50 a	23	27		
TP5	10	2.50	2.70	B	Brown silty SAND.			24					2.65-p	
TP6	1	0.10		D	Dark brown slightly sandy slightly gravelly CLAY.			20						
TP6	8	2.50	3.00	B	Brown slightly sandy slightly gravelly CLAY.			25	95	41 a	17	24		
TP7	5	3.50		D	Brown slightly gravelly SAND.			23						
TP8	4	0.20	0.50	B	Brown slightly sandy slightly gravelly silty CLAY.			20	94	48 a	19	29		
TP8	8	2.00	2.20	B	Brown slightly sandy slightly gravelly CLAY.			24	94	46 a	18	28	2.72-p	
TP8	11	3.80		D	Brown slightly gravelly silty SAND.			23						
TP8	14	4.00	4.50	B	Brown SAND.			23						
TP9	4	0.30	0.40	B	Light brown slightly sandy slightly gravelly CLAY.			16						
TP9	12	3.20	3.40	B	Brown slightly sandy slightly gravelly CLAY. Gravel is chalk.			19	95	44 a	21	23		
TT1	1	0.10		D	Brown slightly sandy slightly gravelly CLAY.			22	82	44 a	18	26		
TT1	9	2.50		D	Brown slightly sandy slightly gravelly CLAY.			15	95	40 a	19	21	2.71-p	
TT2	4	1.00	1.25	B	Brown slightly sandy slightly gravelly silty CLAY with rootlets.			24	92	46 a	25	21		
TT2	10	3.25	3.50	B	Brown slightly gravelly sandy silty CLAY.			22	87	37 a	19	18		
TT3	4	1.30	1.60	B	Brown silty CLAY.			20						
TT3	6	2.10	2.50	B	Brown slightly sandy silty CLAY			18	95	43 a	20	23	2.67-p	

General notes: All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : p bulk density, linear
pd dry density
w moisture content
* test carried out to BS EN ISO 17892-1 2014

WL Liquid limit
a 4 point cone test
b 1 point cone test

WP Plastic limit
NP non - plastic
IP Plasticity Index

<425um preparation
n from natural soil
s sieved specimen

ps particle density
-g = gas jar
-p = small pyknometer

QA Ref
SLR 1
Rev 2.91
Mar 17

SOCOTEC

Project No A8015-18
Project Name VPI IMMINGHAM

Figure

INDX

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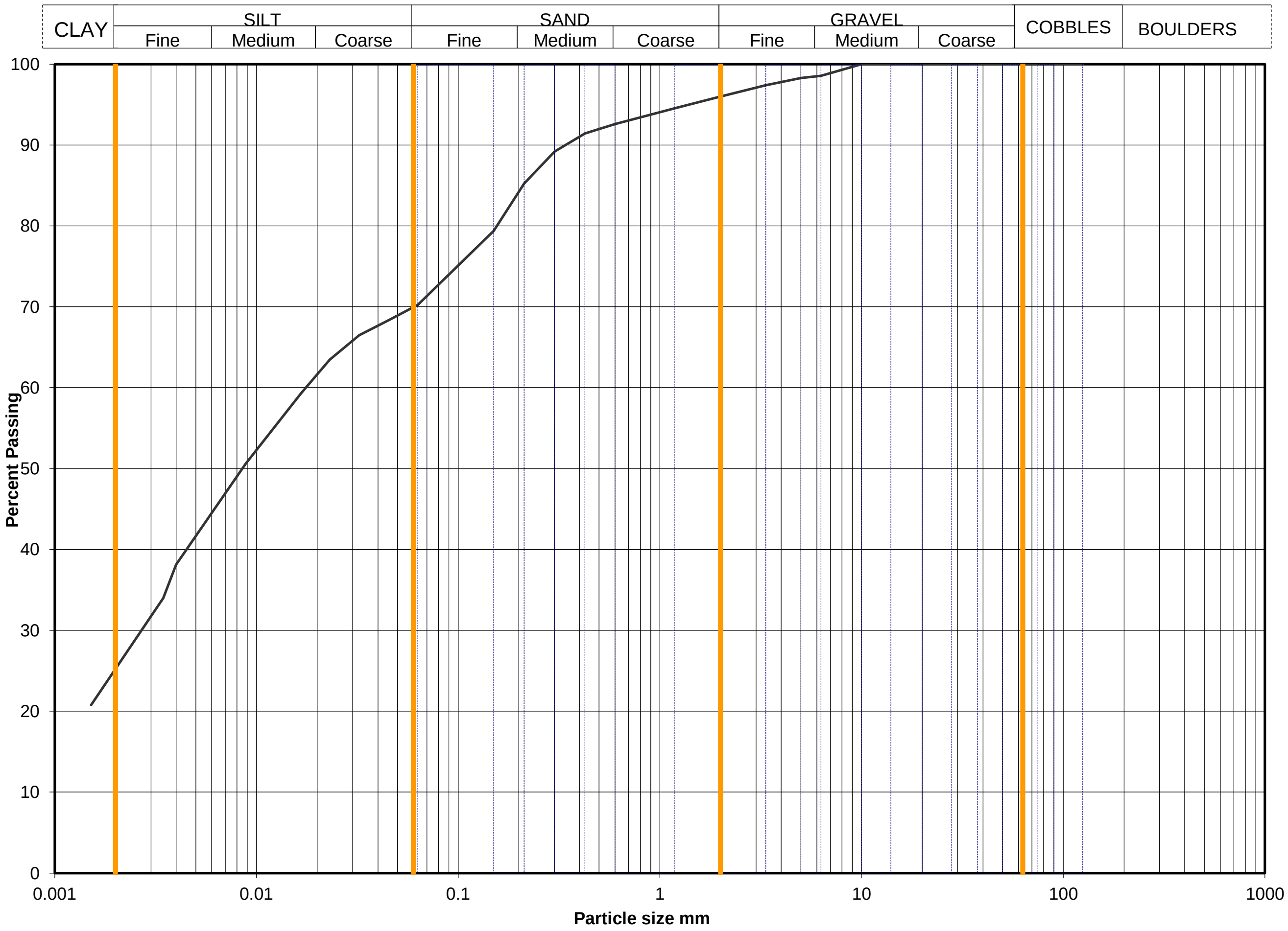
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180409104548	Hole No	BH1
		Sample Depth (m BGL)	0.50 - 0.70
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	70
90	100	0.0453	68
75	100	0.0323	66
63	100	0.0231	63
50	100	0.0166	59
37.5	100	0.0089	51
28	100	0.0040	38
20	100	0.0035	34
14	100	0.0015	21
10	100		
6.3	99		
5.0	98		
3.35	97		
2.00	96		
1.18	95	Particle density, Mg/m3	
0.600	93		
0.425	91	2.65	assumed
0.300	89	Dry mass of sample, kg	
0.212	85		
0.150	79	12.2	
0.063	70		

Soil description	Greyish brown slightly sandy slightly gravelly silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	26	26
	Silt	45	45
*<60mm values to aid description only	Clay	25	25

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

PSD

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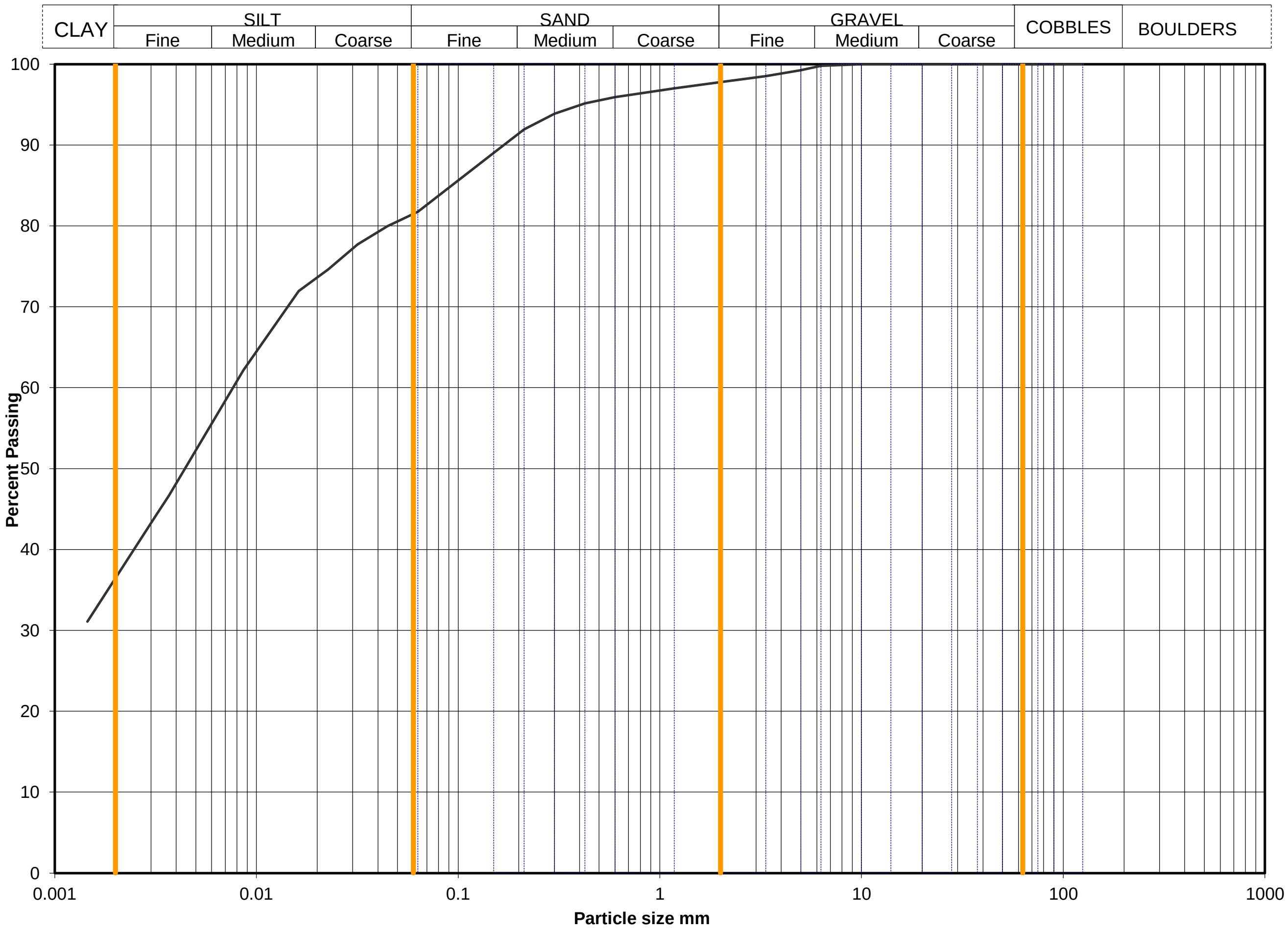
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180409104626	Hole No	BH1
		Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B9
		Specimen Ref	



Sieving		**Sedimentation**	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	82
90	100	0.0446	80
75	100	0.0318	78
63	100	0.0227	75
50	100	0.0162	72
37.5	100	0.0086	62
28	100	0.0037	47
20	100	0.0032	44
14	100	0.0015	31
10	100		
6.3	100		
5.0	99		
3.35	99		
2.00	98		
1.18	97	Particle density, Mg/m3	
0.600	96		
0.425	95	2.71	measured
0.300	94	Dry mass of sample, kg	
0.212	92		
0.150	89		
0.063	82	11.1	

Soil description	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	16	16
*<60mm values to aid description only	Silt	45	45
	Clay	36	36

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

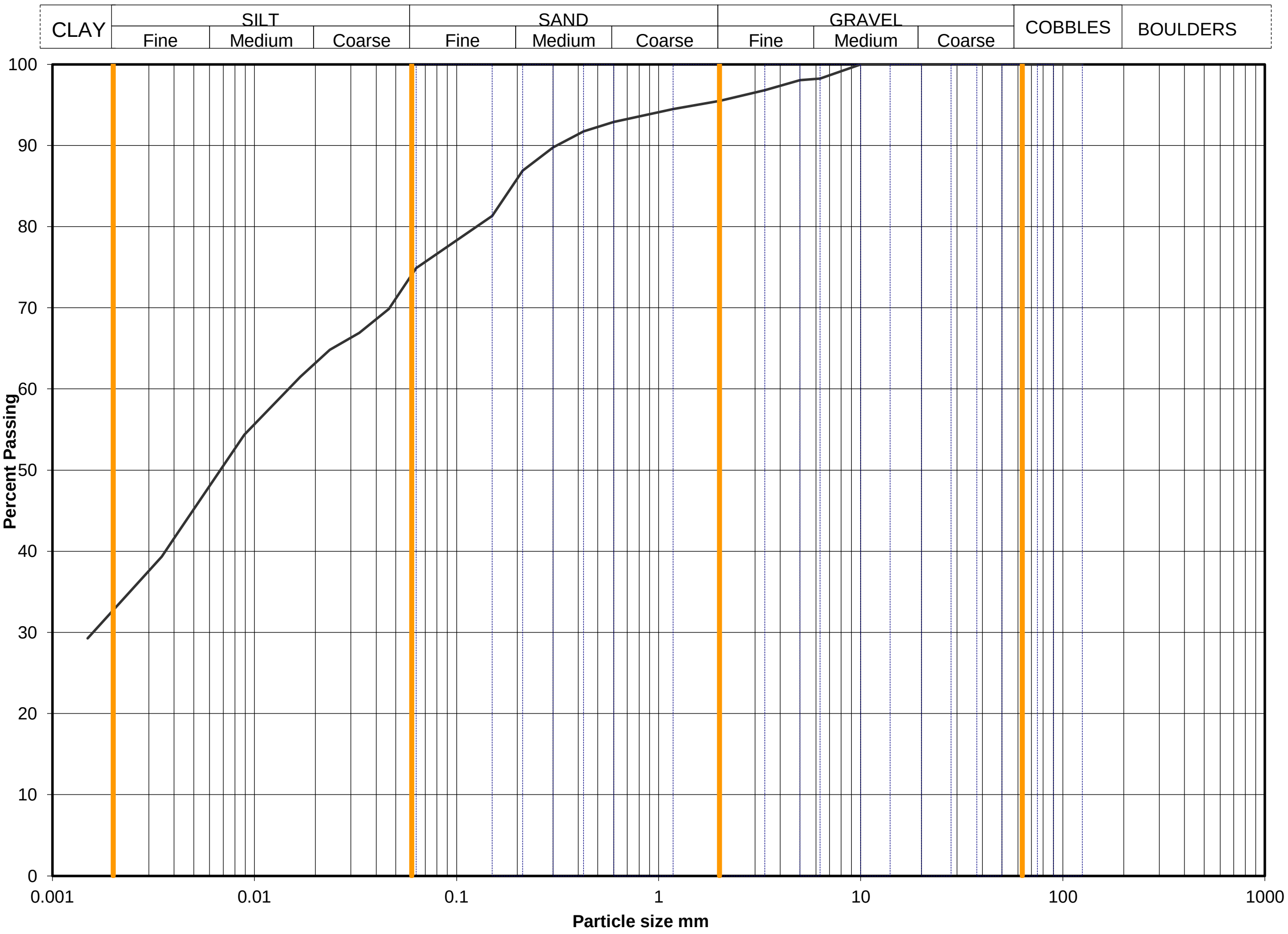
PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	A8015-1820180409104655

Hole No	BH1
Sample Depth (m BGL)	4.00 - 4.45
Sample Type and No	B13
Specimen Ref	



Sieving		**Sedimentation**	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	75
90	100	0.0463	70
75	100	0.0331	67
63	100	0.0236	65
50	100	0.0168	61
37.5	100	0.0089	54
28	100	0.0041	42
20	100	0.0035	39
14	100	0.0015	29
10	100		
6.3	98		
5.0	98		
3.35	97		
2.00	95		
1.18	94	Particle density, Mg/m3	
0.600	93		
0.425	92	2.65	assumed
0.300	90	Dry mass of sample, kg	
0.212	87		
0.150	81	13.1	
0.063	75		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	5	5
	Sand	21	21
*<60mm values to aid description only	Silt	42	42
	Clay	33	33

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

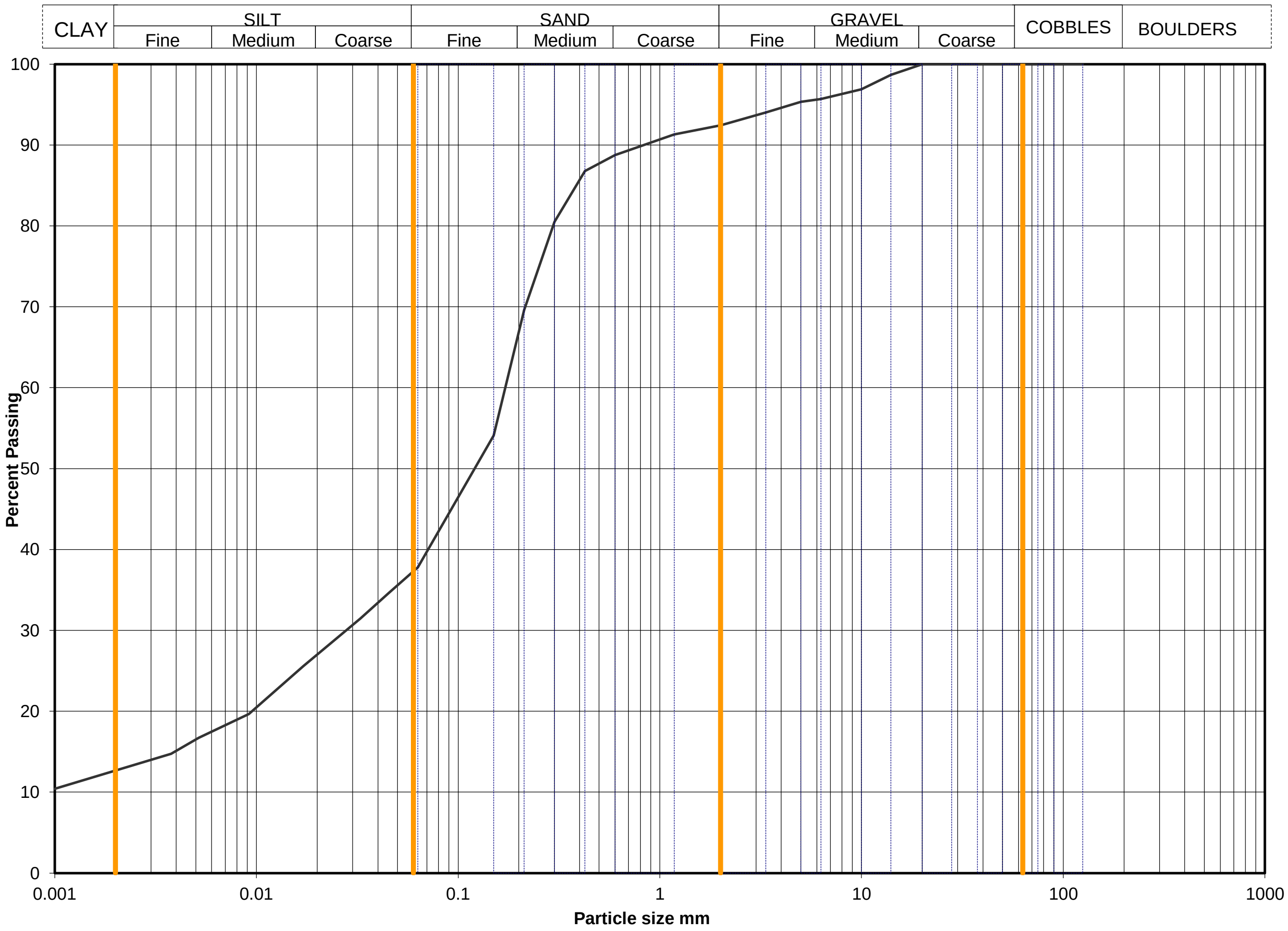
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH1
		Sample Depth (m BGL)	13.00 - 13.50
	A8015-1820180409105002	Sample Type and No	B27
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0453	35
75	100	0.0328	31
63	100	0.0237	29
50	100	0.0171	26
37.5	100	0.0092	20
28	100	0.0052	17
20	100	0.0038	15
14	99	0.0008	10
10	97		
6.3	96		
5.0	95		
3.35	94		
2.00	92		
1.18	91	Particle density, Mg/m3	
0.600	89		
0.425	87	2.68	assumed
0.300	81	Dry mass of sample, kg	
0.212	70		
0.150	54	8.5	
0.063	38		

Soil description	Brown slightly gravelly sandy silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	8	8
	Sand	55	55
*<60mm values to aid description only	Silt	25	25
	Clay	13	13

Uniformity Coefficient	**D60 / D10**	196

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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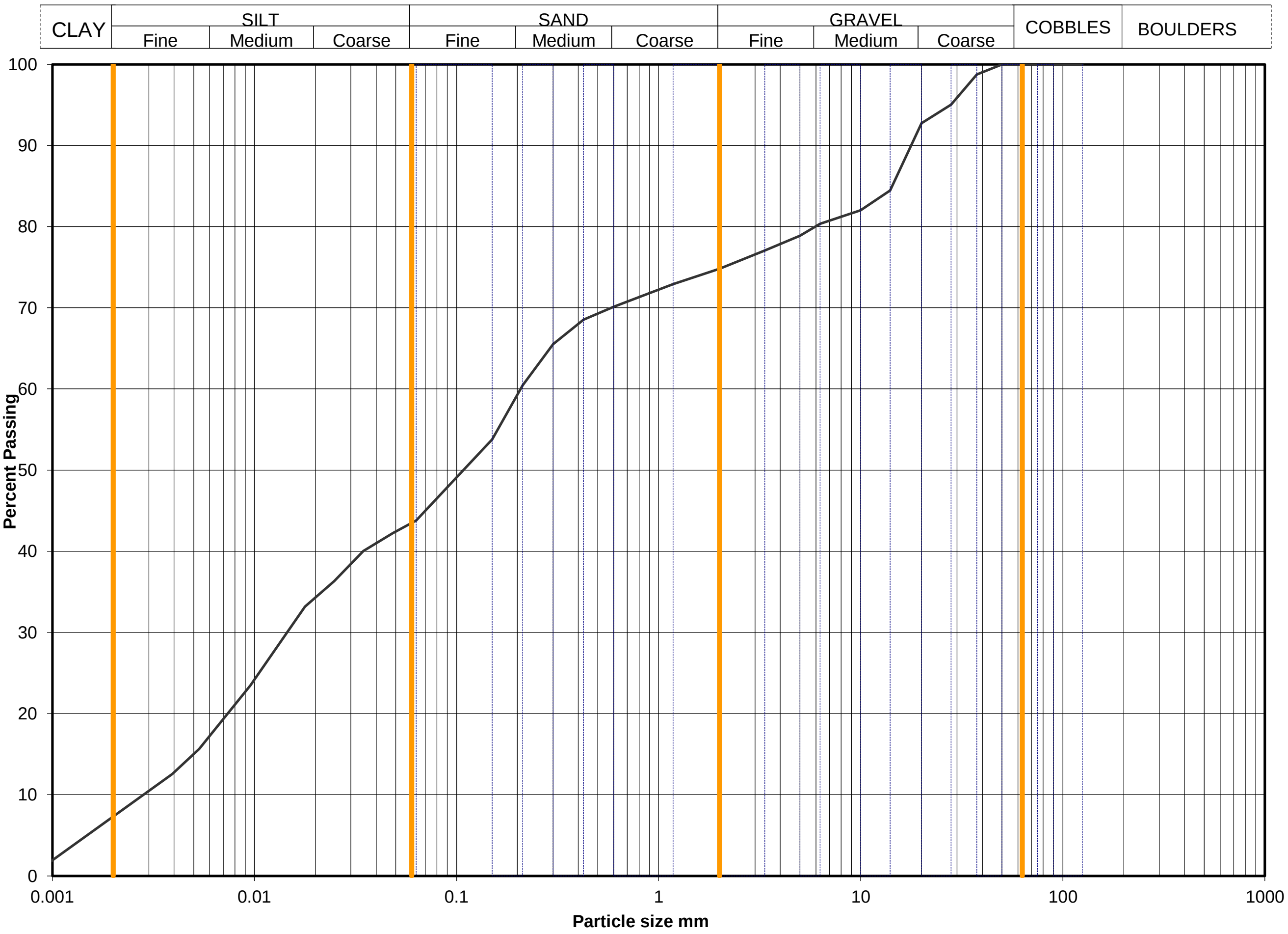
Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413011418	Sample Depth (m BGL)	0.60 - 1.00
		Sample Type and No	B4
		Specimen Ref	



Sieving		**Sedimentation**	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	44
90	100	0.0484	42
75	100	0.0346	40
63	100	0.0248	36
50	100	0.0178	33
37.5	99	0.0095	23
28	95	0.0053	16
20	93	0.0039	13
14	84	0.0009	1
10	82		
6.3	80		
5.0	79		
3.35	77		
2.00	75		
1.18	73	Particle density, Mg/m3	
0.600	70		
0.425	69	2.65	assumed
0.300	66	Dry mass of sample, kg	
0.212	60		
0.150	54	5.1	
0.063	44		

Soil description	Dark brown slightly sandy slightly gravelly clayey SILT.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	25	25
	Sand	31	31
*<60mm values to aid description only	Silt	37	37
	Clay	7	7

Uniformity Coefficient	**D60 / D10**	73

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

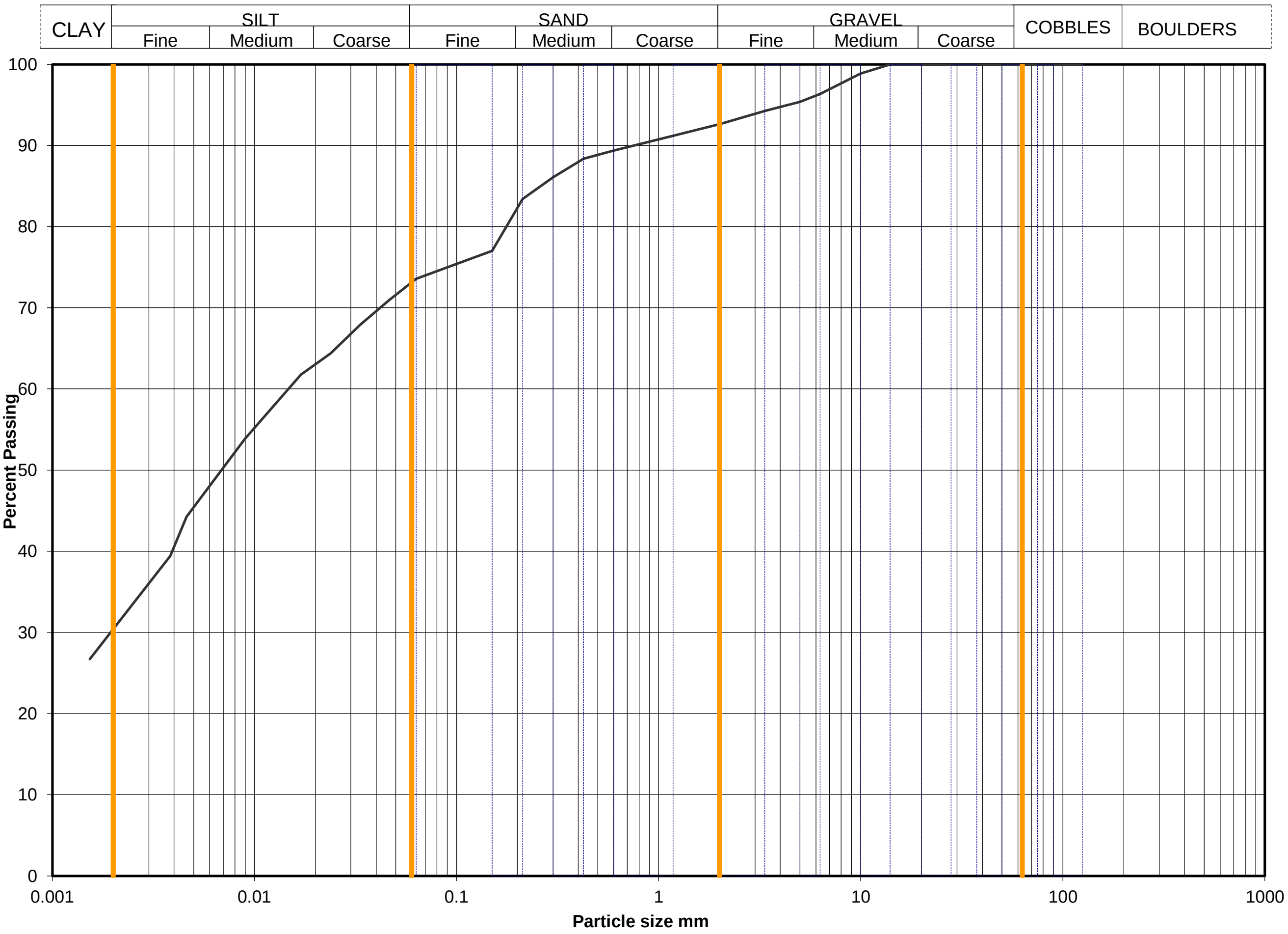
PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	A8015-1820180413011538

Hole No	BH2
Sample Depth (m BGL)	2.70 - 2.80
Sample Type and No	D12
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	74
90	100	0.0466	71
75	100	0.0333	68
63	100	0.0238	64
50	100	0.0170	62
37.5	100	0.0090	54
28	100	0.0046	44
20	100	0.0038	39
14	100	0.0015	27
10	99		
6.3	96		
5.0	95		
3.35	94		
2.00	93		
1.18	91	Particle density, Mg/m3	
0.600	89		
0.425	88	2.65 assumed	
0.300	86	Dry mass of sample, kg	
0.212	83		
0.150	77	0.9	
0.063	74		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	7	7
	Sand	19	19
*<60mm values to aid description only	Silt	43	43
	Clay	30	30

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

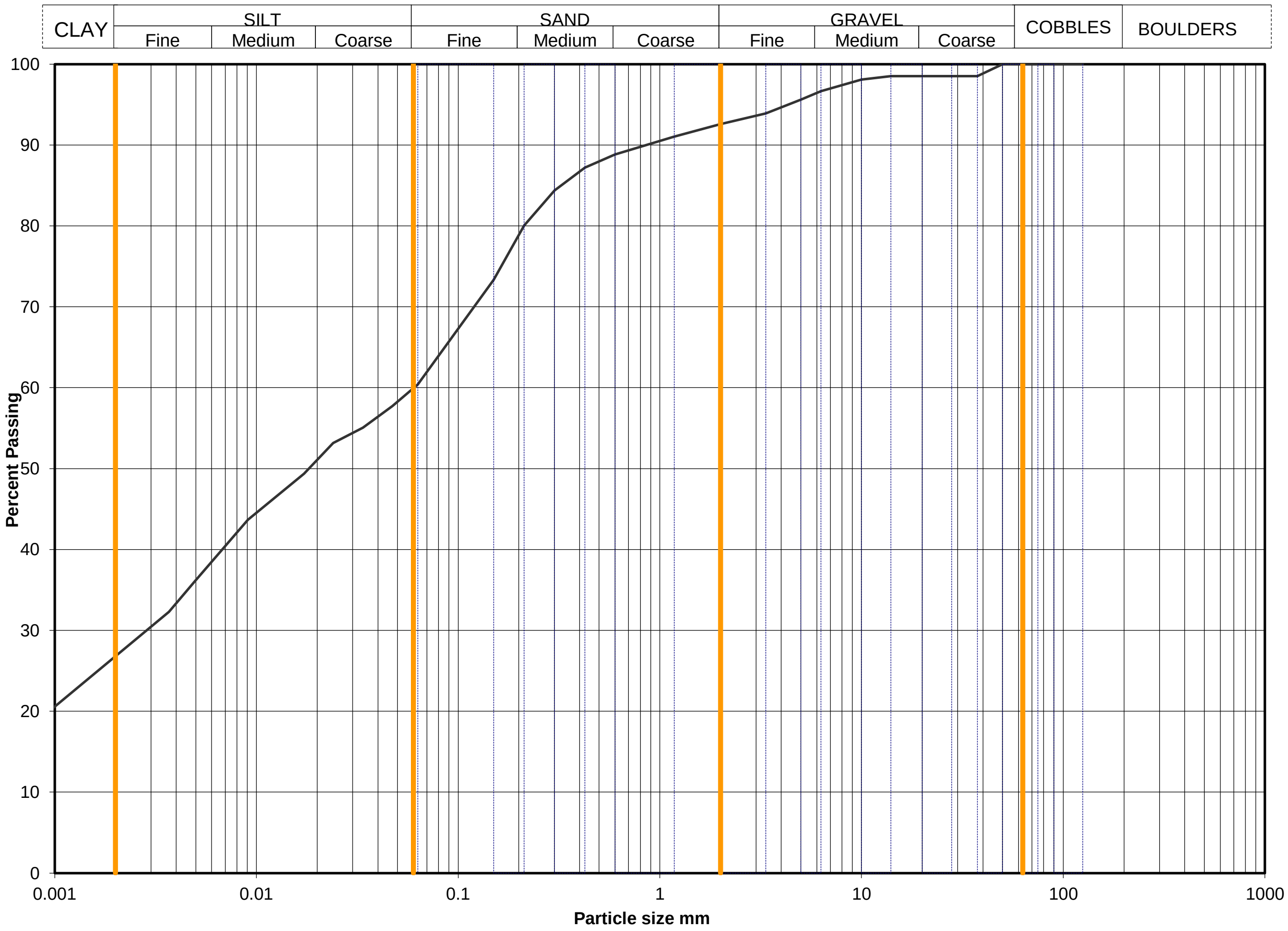
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH2
		Sample Depth (m BGL)	9.50 - 9.95
	A8015-1820180413012751	Sample Type and No	UT40
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	60
90	100	0.0473	58
75	100	0.0338	55
63	100	0.0241	53
50	100	0.0172	49
37.5	99	0.0091	44
28	99	0.0050	36
20	99	0.0037	32
14	99	0.0008	19
10	98		
6.3	97		
5.0	96		
3.35	94		
2.00	93		
1.18	91	Particle density, Mg/m3	
0.600	89		
0.425	87	2.65 assumed	
0.300	84	Dry mass of sample, kg	
0.212	80		
0.150	73	7.2	
0.063	60		

Soil description	Firm bown slightly sandy slightly gravelly silty CLAY. Gravel is chalk fragments.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

		Whole	*<60mm
Sample Proportions	Cobbles / boulders	0	0
	Gravel	7	7
	Sand	32	32
*<60mm values to aid description only	Silt	34	34
	Clay	27	27

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

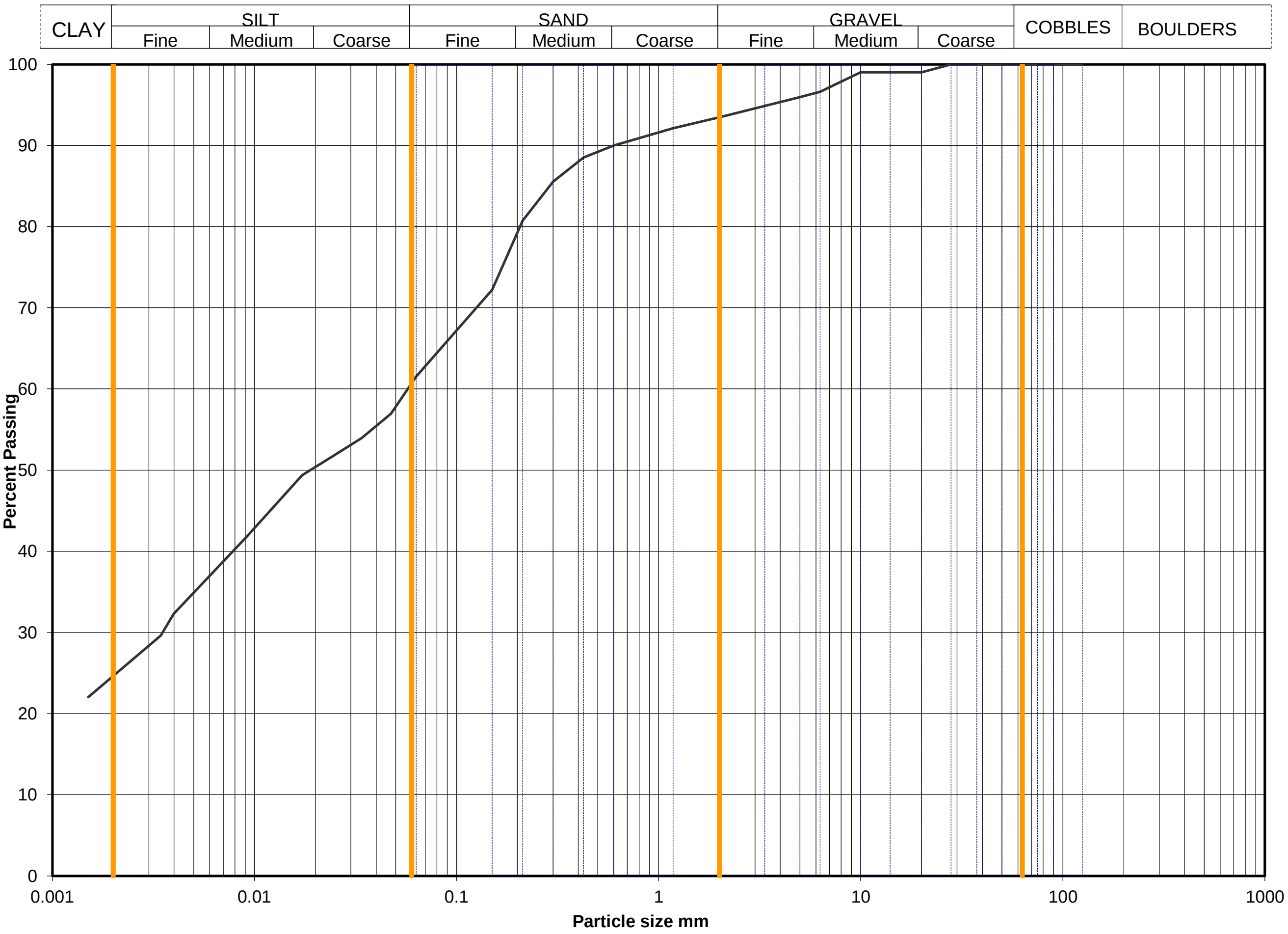
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180413012921	Hole No	BH2
		Sample Depth (m BGL)	13.10 - 13.55
		Sample Type and No	B51
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	62
90	100	0.0474	57
75	100	0.0339	54
63	100	0.0242	52
50	100	0.0172	49
37.5	100	0.0091	42
28	100	0.0040	32
20	99	0.0034	30
14	99	0.0015	22
10	99		
6.3	97		
5.0	96		
3.35	95		
2.00	93		
1.18	92	Particle density, Mg/m3	
0.600	90		
0.425	89	2.65 assumed	
0.300	86	Dry mass of sample, kg	
0.212	81		
0.150	72		
0.063	62	15.8	

Soil description	Brown slightly sandy slightly gravelly silty CLAY. Gravel is chalk.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	7	7
	Sand	32	32
*<60mm values to aid description only	Silt	37	37
	Clay	25	25

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

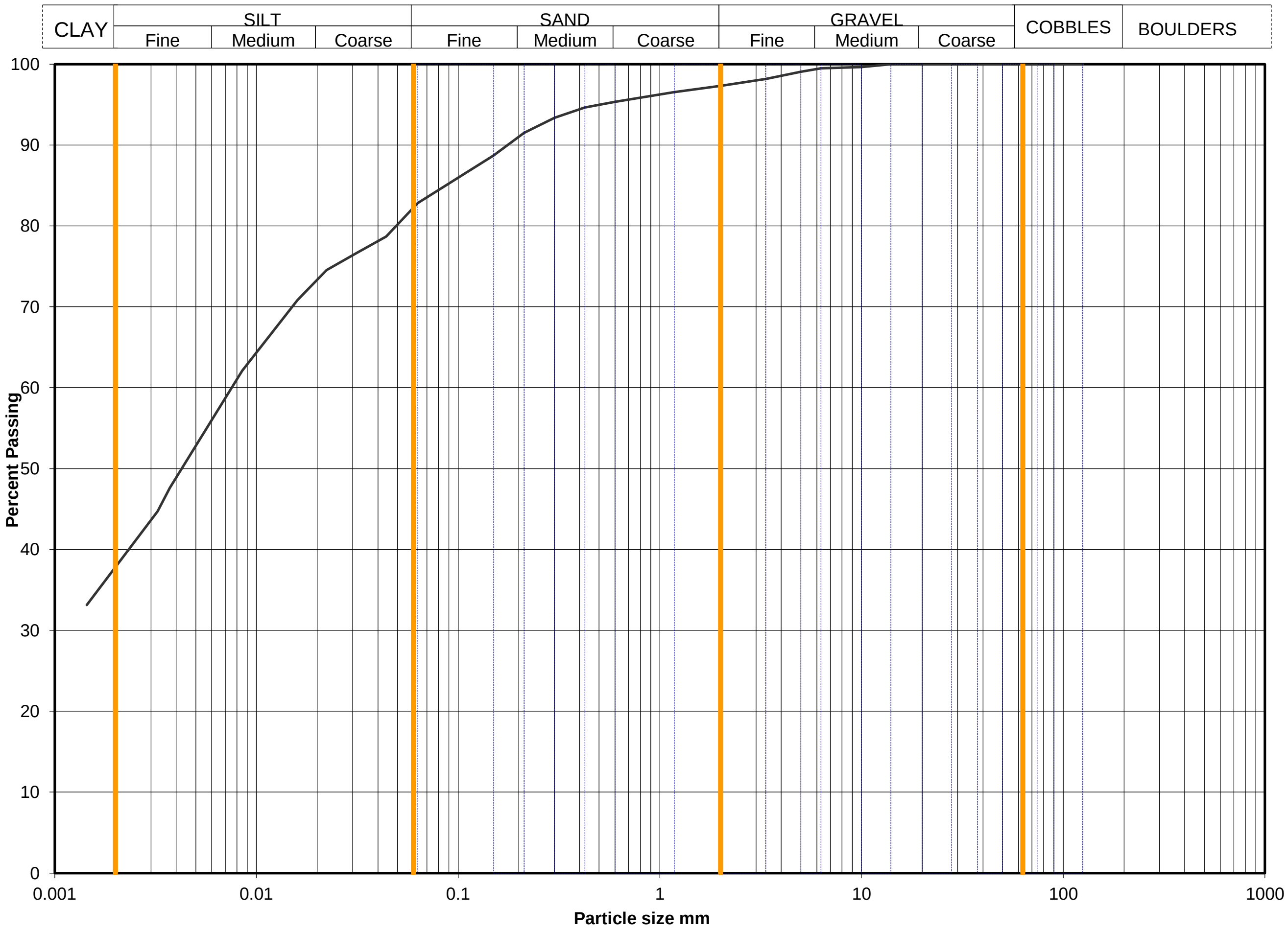
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180413102616	Hole No	BH3
		Sample Depth (m BGL)	1.65 - 2.00
		Sample Type and No	B3
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	83
90	100	0.0439	79
75	100	0.0313	77
63	100	0.0223	75
50	100	0.0160	71
37.5	100	0.0085	62
28	100	0.0037	48
20	100	0.0032	45
14	100	0.0014	33
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	97		
1.18	97	Particle density, Mg/m3	
0.600	95		
0.425	95	2.71	measured
0.300	93	Dry mass of sample, kg	
0.212	91		
0.150	89	6.9	
0.063	83		

Soil description	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

		Whole	*<60mm
Sample Proportions *<60mm values to aid description only	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	14	14
	Silt	45	45
	Clay	38	38

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

Project No A8015-18

Project Name VPI IMMINGHAM

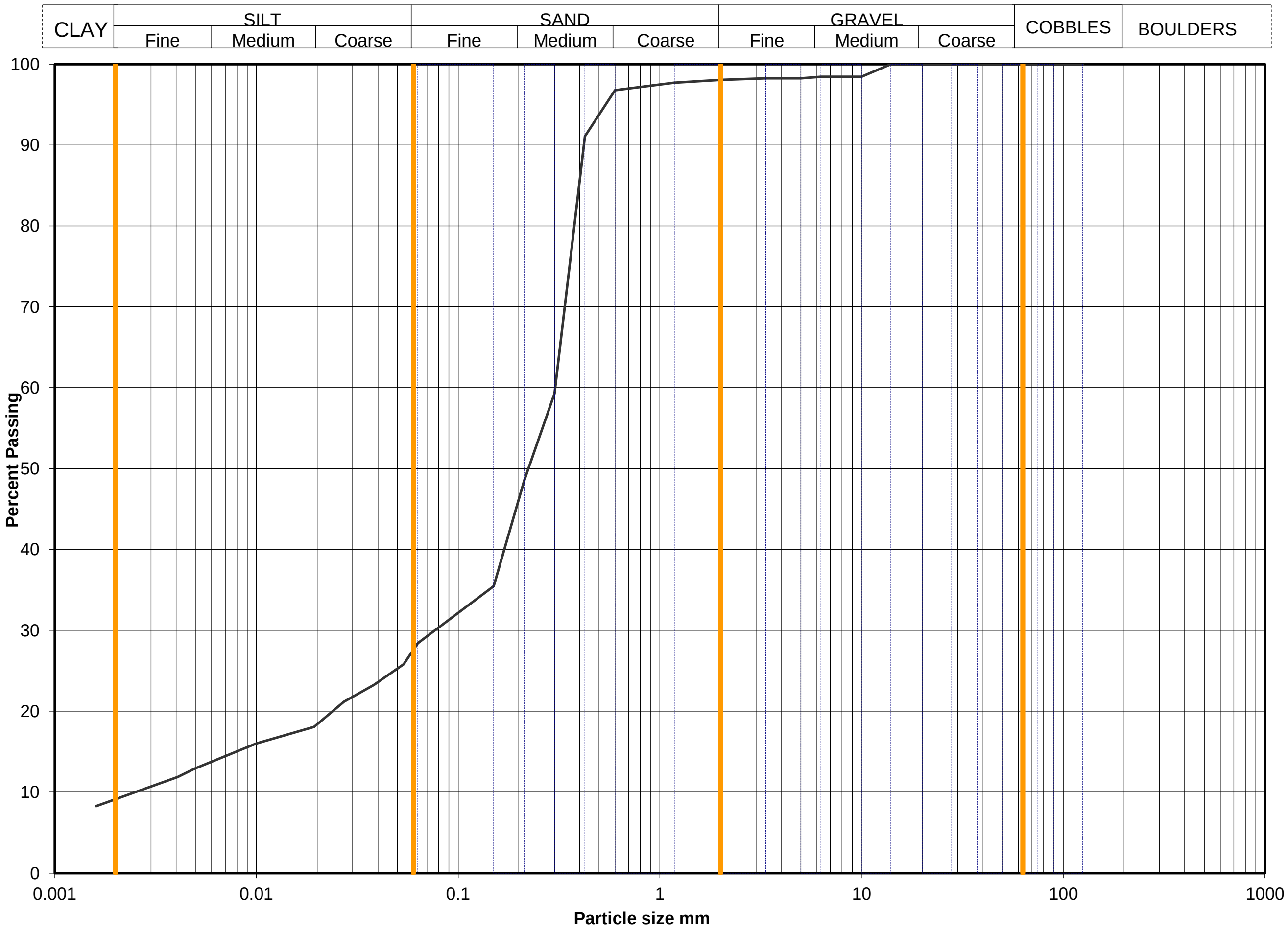
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180413102638	Hole No	BH3
		Sample Depth (m BGL)	4.00 - 4.45
		Sample Type and No	D8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	28
90	100	0.0537	26
75	100	0.0382	23
63	100	0.0271	21
50	100	0.0193	18
37.5	100	0.0100	16
28	100	0.0050	13
20	100	0.0041	12
14	100	0.0016	8
10	98		
6.3	98		
5.0	98		
3.35	98		
2.00	98		
1.18	98	Particle density, Mg/m3 2.65 assumed	
0.600	97		
0.425	91		
0.300	59	Dry mass of sample, kg 0.4	
0.212	48		
0.150	35		
0.063	28		

Soil description	Brown slightly gravelly very sandy silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	70	70
*<60mm values to aid description only	Silt	19	19
	Clay	9	9

Uniformity Coefficient	**D60 / D10**	120

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

Project No	A8015-18
Project Name	VPI IMMINGHAM

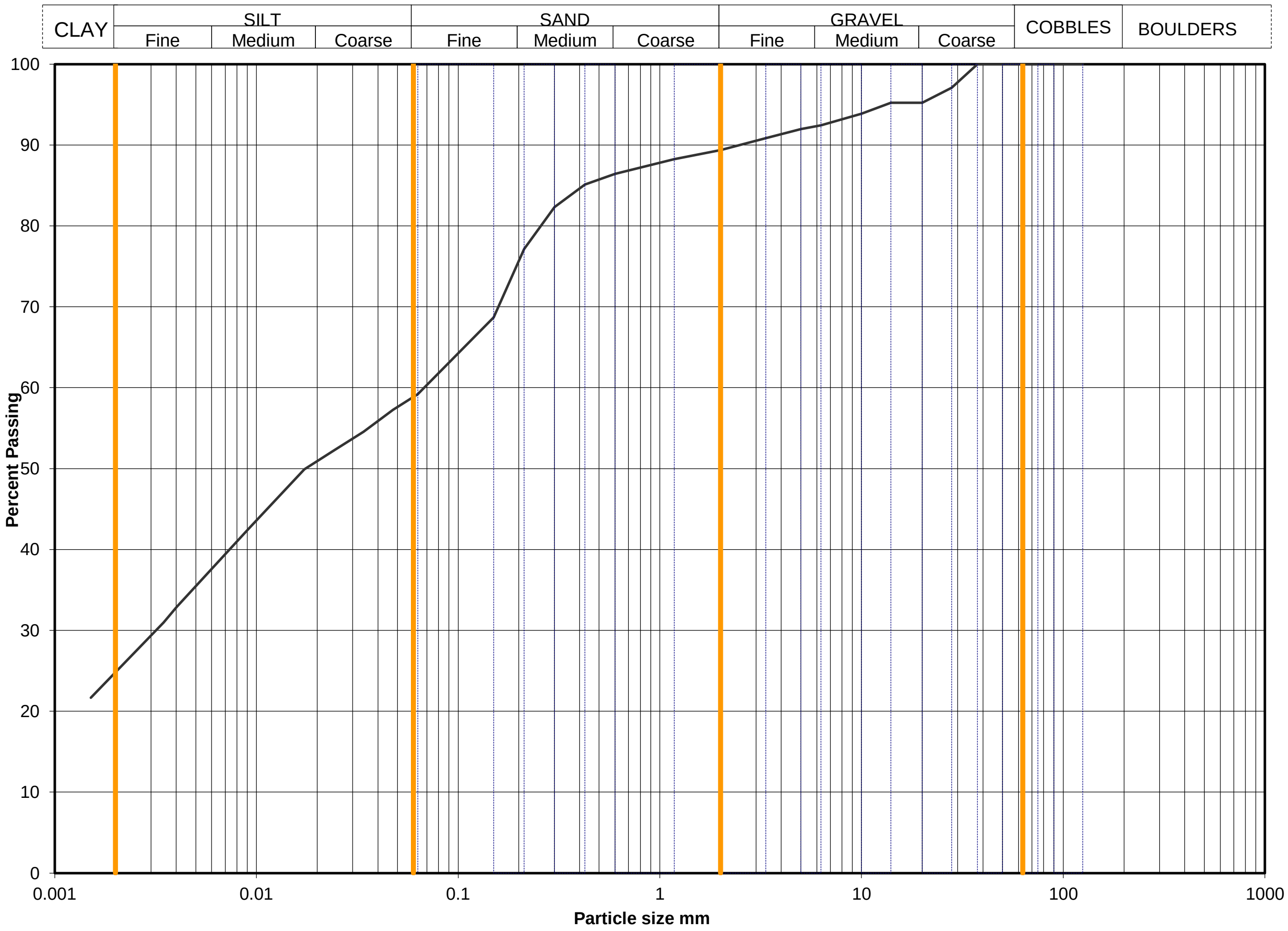
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH3
	A8015-1820180413102754	Sample Depth (m BGL)	9.00 - 9.45
		Sample Type and No	UT19
		Specimen Ref	



Sieving		**Sedimentation**	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	59
90	100	0.0476	57
75	100	0.0340	55
63	100	0.0242	52
50	100	0.0173	50
37.5	100	0.0091	43
28	97	0.0040	33
20	95	0.0035	31
14	95	0.0015	22
10	94		
6.3	92		
5.0	92		
3.35	91		
2.00	89		
1.18	88	Particle density, Mg/m3	
0.600	86		
0.425	85	2.65	assumed
0.300	82	Dry mass of sample, kg	
0.212	77		
0.150	69	4.7	
0.063	59		

Soil description	Firm greyish brown slightly sandy slightly gravelly silty CLAY. Gravel contains chalk fragments.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	11	11
*<60mm values to aid description only	Sand	30	30
	Silt	34	34
	Clay	25	25

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

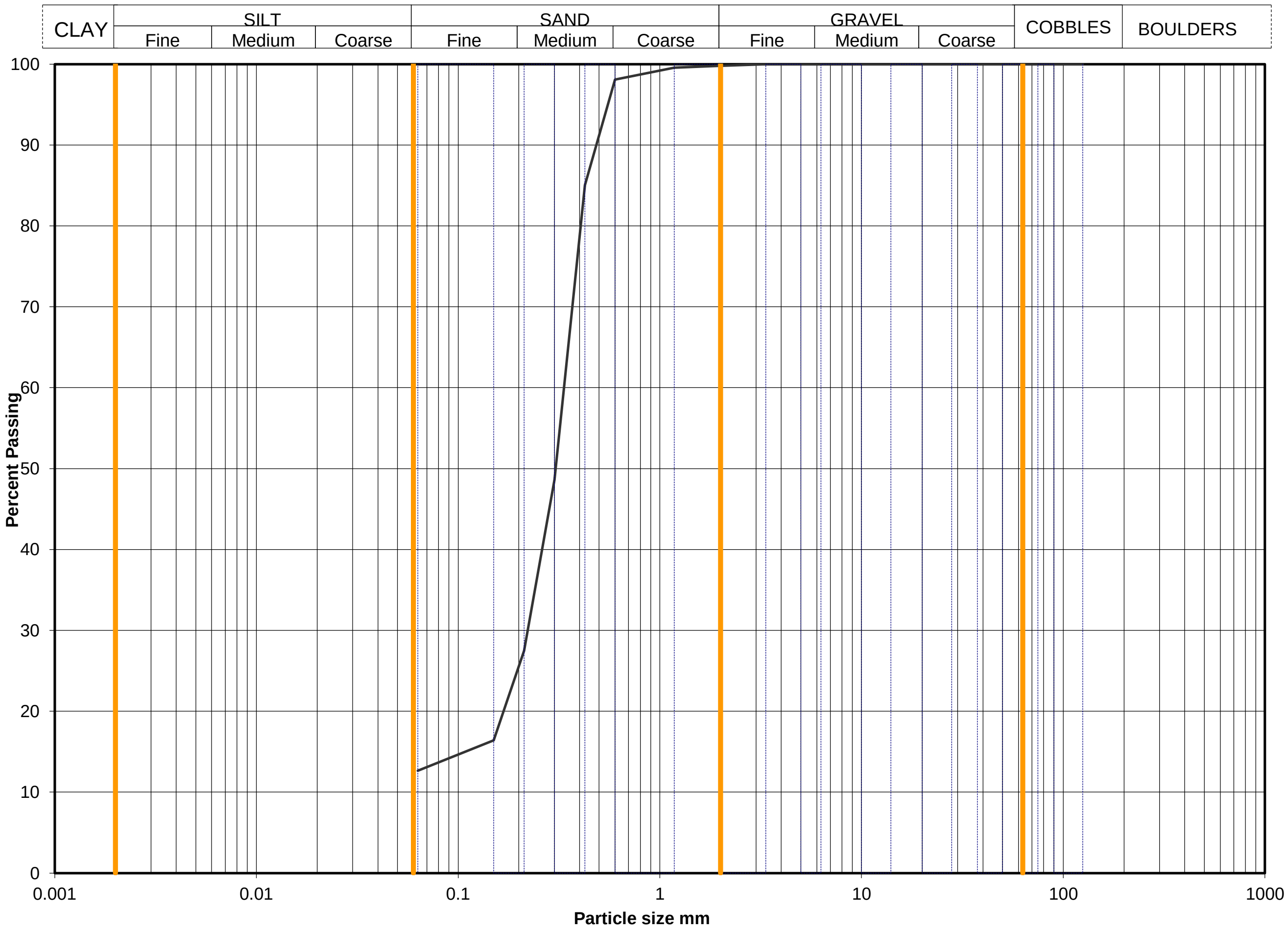
PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	A8015-1820180413102944

Hole No	BH3
Sample Depth (m BGL)	13.50 - 13.95
Sample Type and No	D32
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	98		
0.425	85		
0.300	49	Dry mass of sample, kg 0.4	
0.212	27		
0.150	16		
0.063	13		

Soil description	Light brown silty SAND.
Preparation / Pretreatment	Sieve: natural material
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	87	87
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	13	13

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

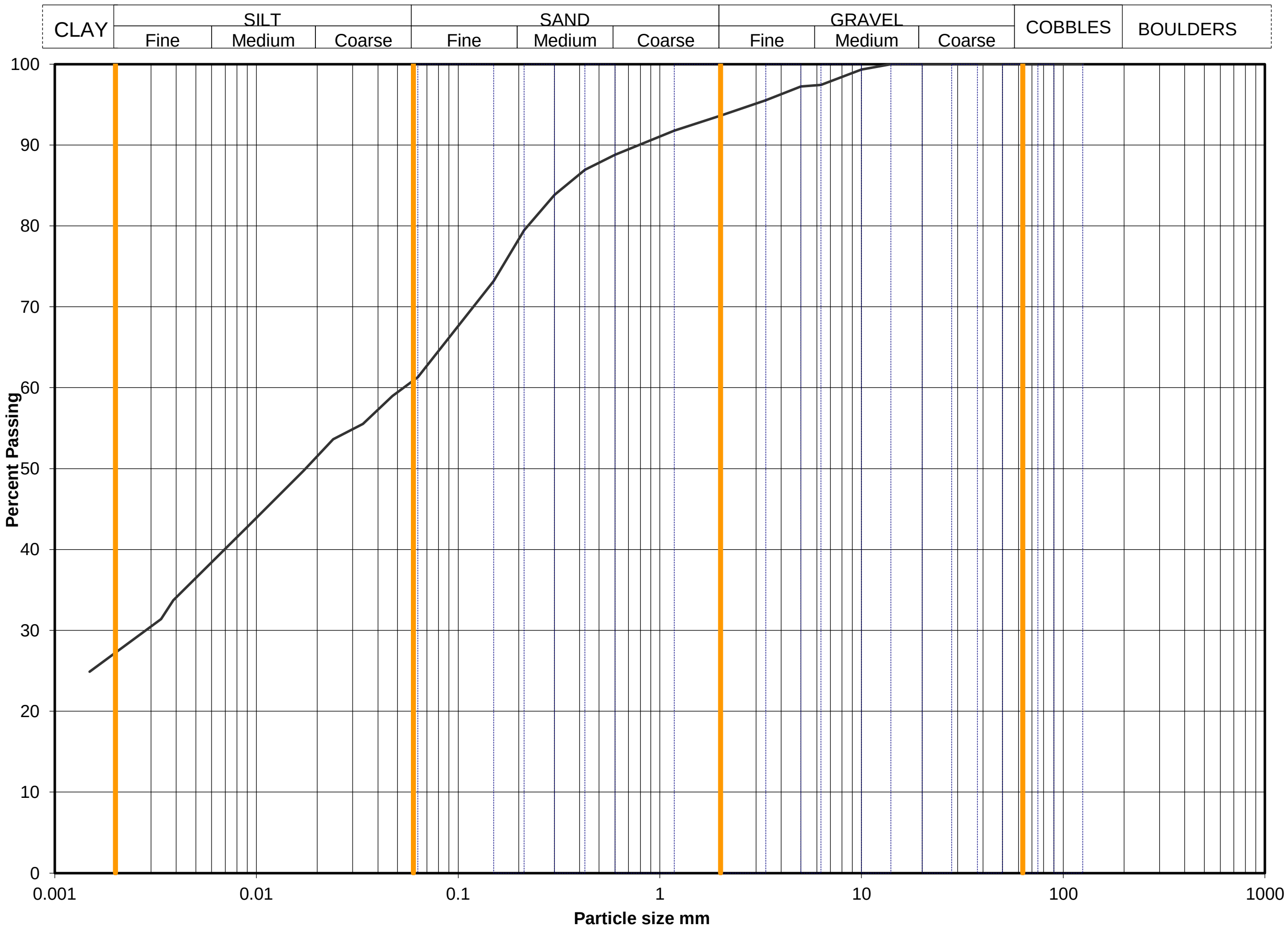
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180418115116	Hole No	BH4
		Sample Depth (m BGL)	5.50 - 6.00
		Sample Type and No	B13
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	61
90	100	0.0472	59
75	100	0.0338	56
63	100	0.0241	54
50	100	0.0172	50
37.5	100	0.0091	43
28	100	0.0039	34
20	100	0.0034	31
14	100	0.0015	25
10	99		
6.3	97		
5.0	97		
3.35	96		
2.00	94		
1.18	92	Particle density, Mg/m3 2.65 assumed	
0.600	89		
0.425	87		
0.300	84	Dry mass of sample, kg 7.9	
0.212	79		
0.150	73		
0.063	61		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

		Whole	*<60mm
Sample Proportions *<60mm values to aid description only	Cobbles / boulders	0	0
	Gravel	6	6
	Sand	32	32
	Silt	34	34
	Clay	27	27

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No A8015-18
Project Name VPI IMMINGHAM

Figure
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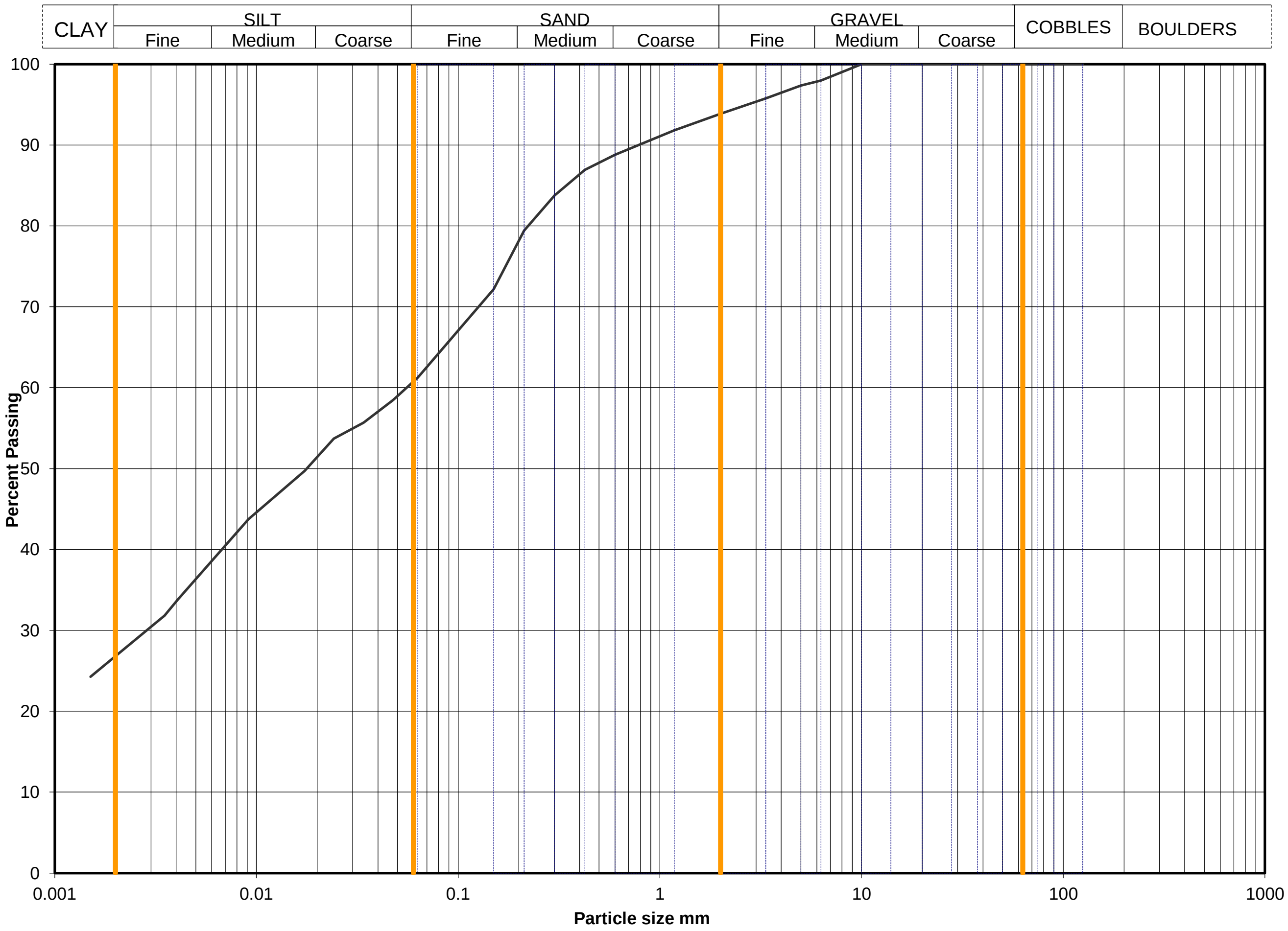
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-1820180418120720

Hole No	BH5
Sample Depth (m BGL)	7.10 - 7.55
Sample Type and No	B26
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	61
90	100	0.0476	58
75	100	0.0340	56
63	100	0.0242	54
50	100	0.0174	50
37.5	100	0.0091	44
28	100	0.0041	34
20	100	0.0035	32
14	100	0.0015	24
10	100		
6.3	98		
5.0	97		
3.35	96		
2.00	94		
1.18	92	Particle density, Mg/m3	
0.600	89		
0.425	87	2.65	assumed
0.300	84	Dry mass of sample, kg	
0.212	79		
0.150	72	14.1	
0.063	61		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

		Whole	*<60mm
Sample Proportions *<60mm values to aid description only	Cobbles / boulders	0	0
	Gravel	6	6
	Sand	33	33
	Silt	34	34
	Clay	27	27

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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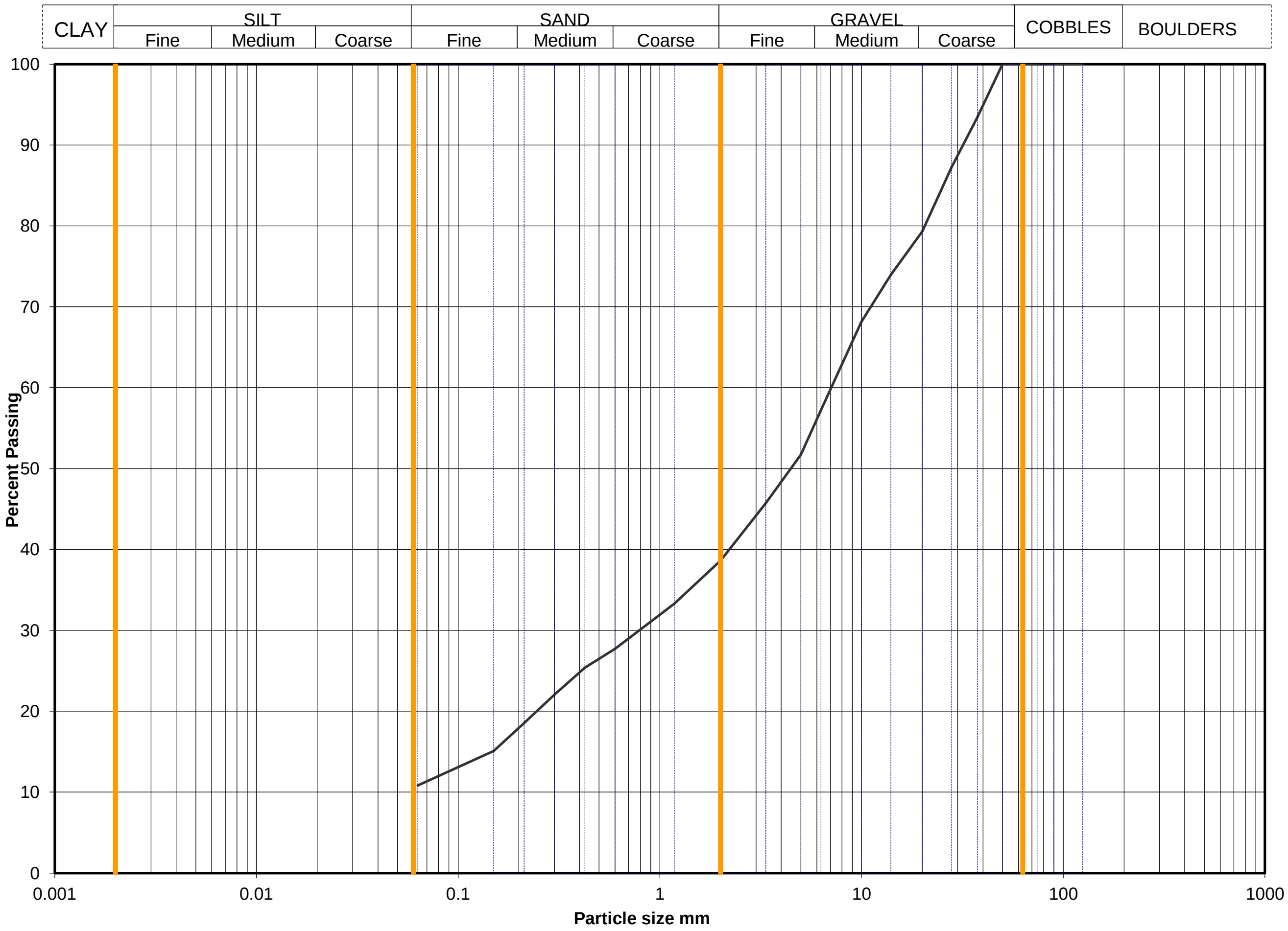
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH6
		Sample Depth (m BGL)	0.00 - 0.30
	A8015-1820180409092440	Sample Type and No	B1
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	93		
28	87		
20	79		
14	74		
10	68		
6.3	57		
5.0	52		
3.35	46		
2.00	39		
1.18	33		
0.600	28		
0.425	25		
0.300	22	Dry mass of sample, kg	
0.212	19		
0.150	15	6.4	
0.063	11		

Soil description	Brown very sandy clayey GRAVEL.
Preparation / Pretreatment	Sieve: natural material
Remarks	

		Whole	*<60mm
Sample Proportions *<60mm values to aid description only	Cobbles / boulders	0	0
	Gravel	61	61
	Sand	28	28
	Silt	silt+clay =	
	Clay	11	11

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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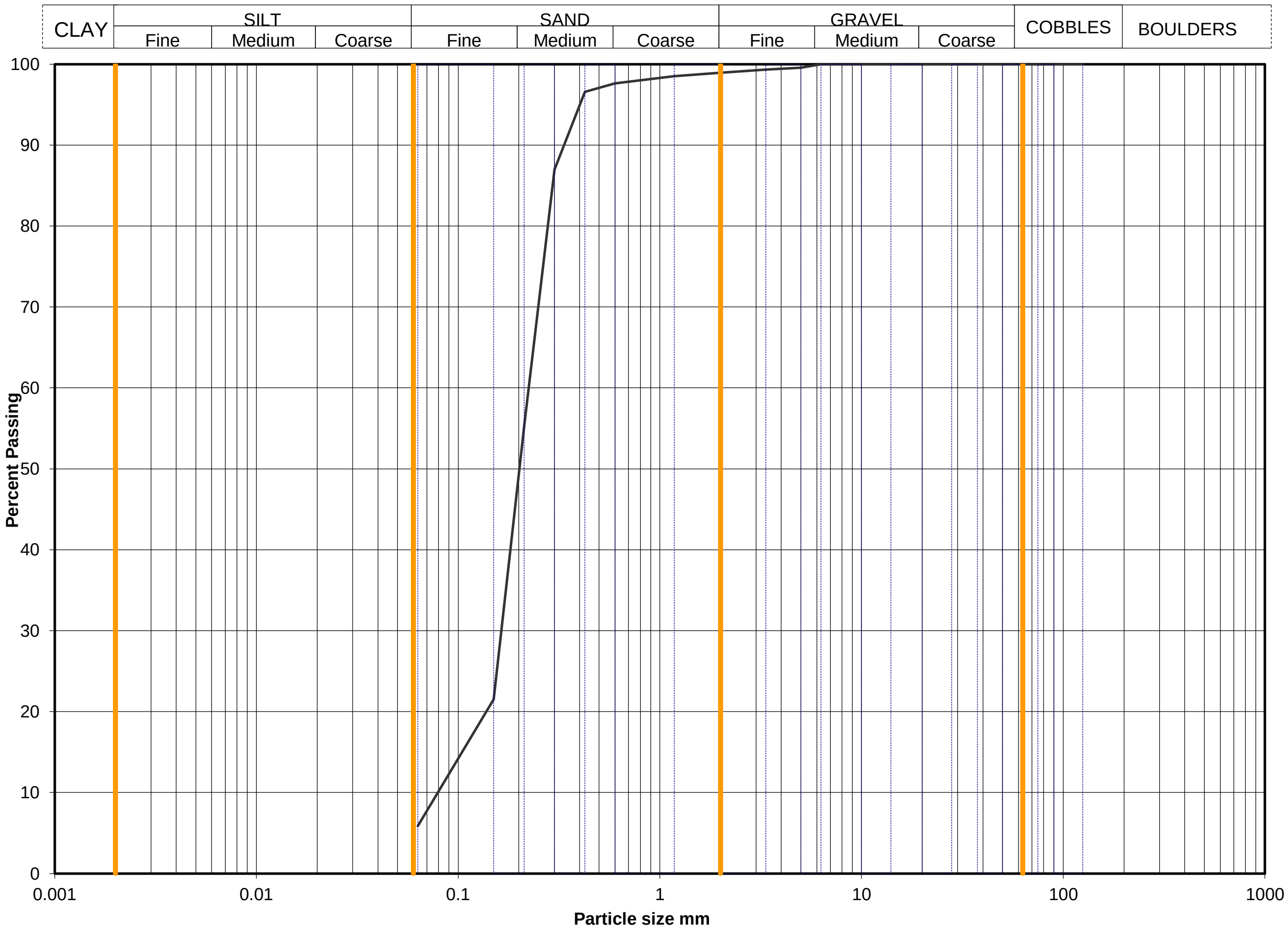
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-18-20180413090532

Hole No	TP2
Sample Depth (m BGL)	4.00 - 4.20
Sample Type and No	B12
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	99		
0.600	98		
0.425	97		
0.300	87	Dry mass of sample, kg	
0.212	55		
0.150	22	11.1	
0.063	6		

Soil description	Brown slightly gravelly silty SAND.
Preparation / Pretreatment	Sieve: natural material
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	1	1
	Sand	93	93
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	6	6

Uniformity Coefficient	**D60 / D10**	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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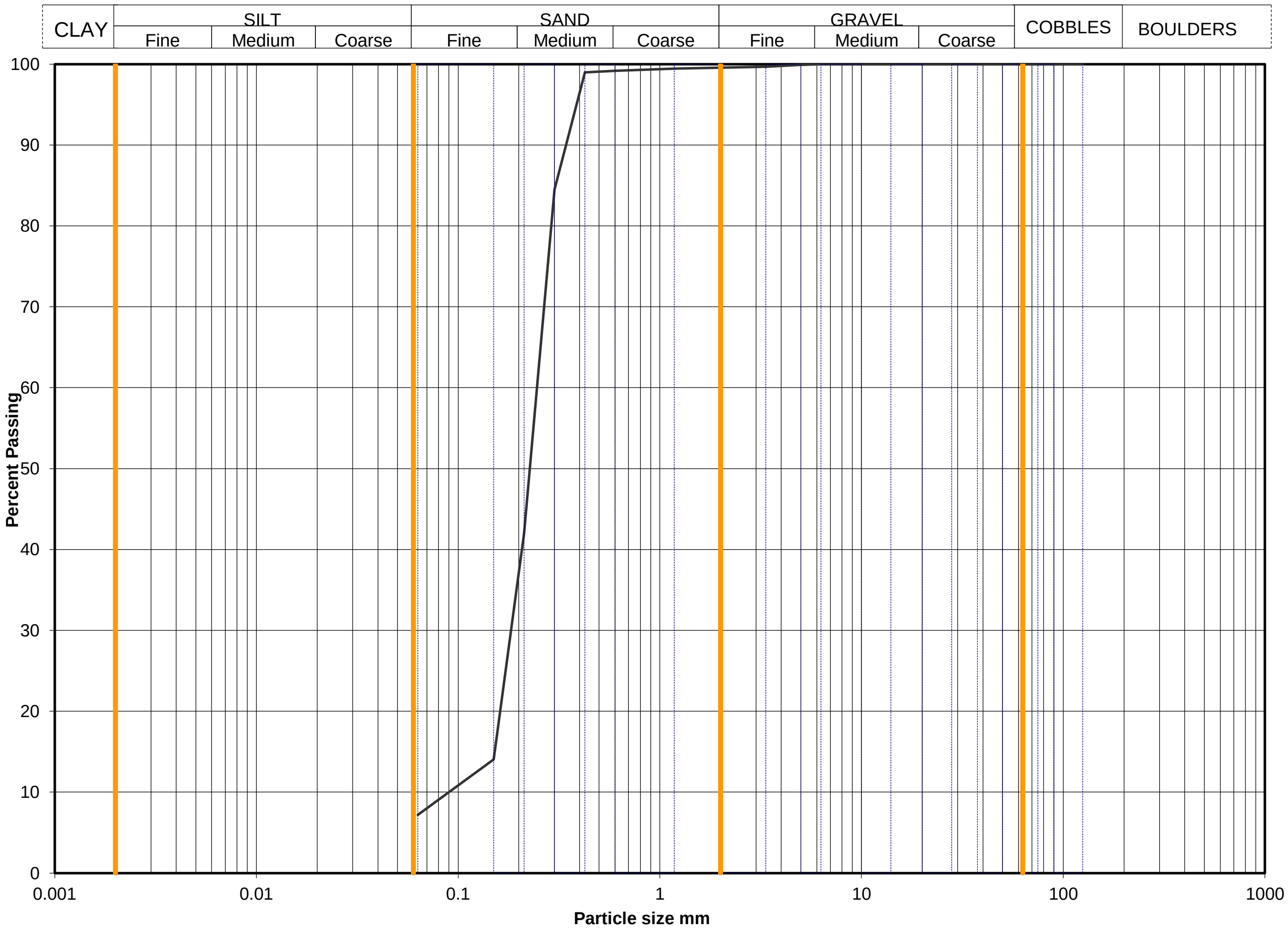
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP5
		Sample Depth (m BGL)	2.50 - 2.70
	A8015-18-20180410090059	Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99		
0.600	99		
0.425	99		
0.300	85	Dry mass of sample, kg	
0.212	42		
0.150	14	13.5	
0.063	7		

Soil description	Brown silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	0	0
	Sand	92	92
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	7	7

Uniformity Coefficient	**D60 / D10**	3

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

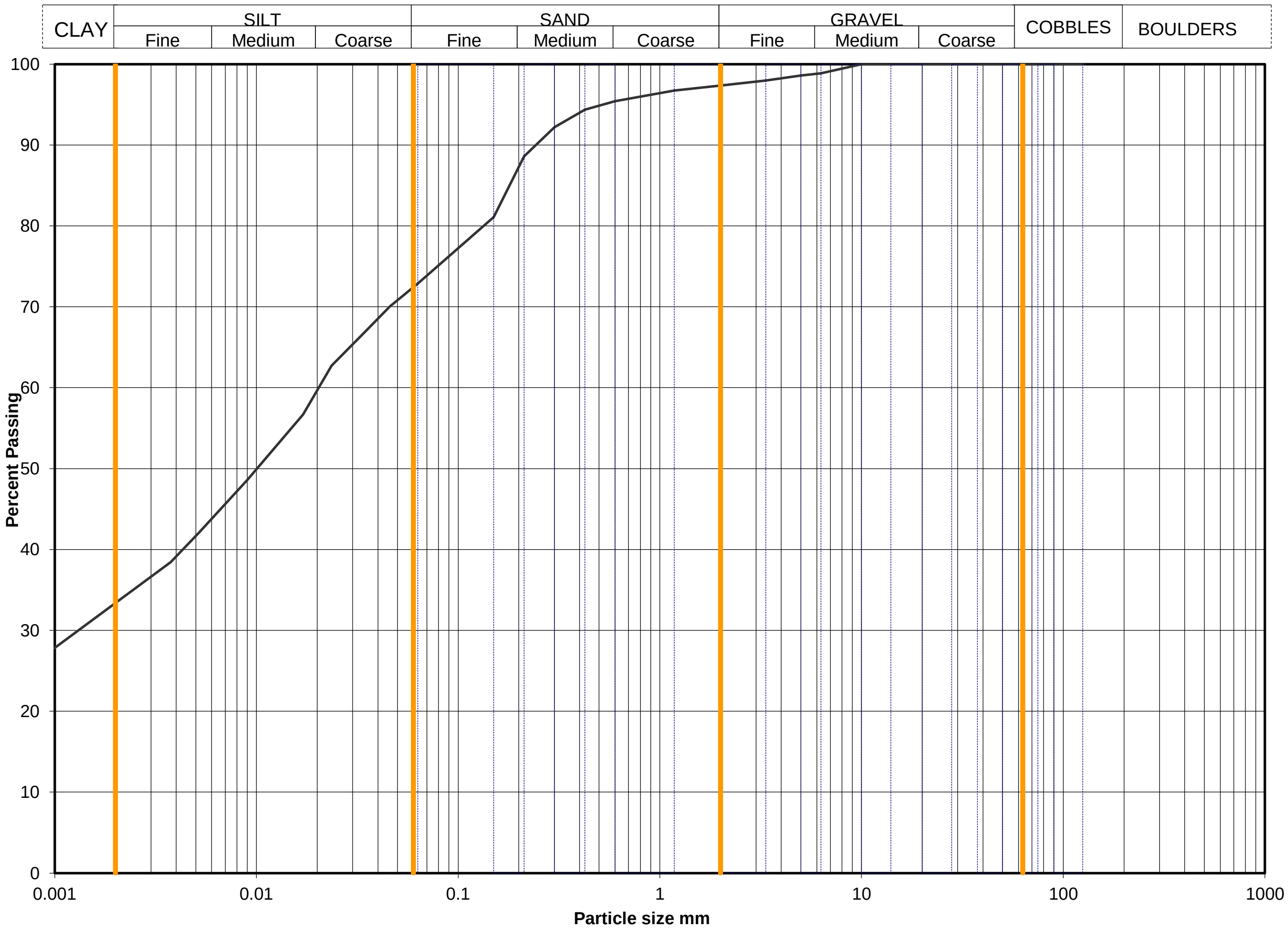
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-18-20180410074235	Hole No	TP8
		Sample Depth (m BGL)	0.20 - 0.50
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	73
90	100	0.0459	70
75	100	0.0329	66
63	100	0.0236	63
50	100	0.0170	57
37.5	100	0.0090	49
28	100	0.0052	42
20	100	0.0038	38
14	100	0.0008	26
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	97		
1.18	97	Particle density, Mg/m3	
0.600	95		
0.425	94	2.65	assumed
0.300	92	Dry mass of sample, kg	
0.212	89		
0.150	81	10.6	
0.063	73		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	24	24
	Silt	39	39
	Clay	33	33

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

Project No A8015-18

Project Name VPI IMMINGHAM

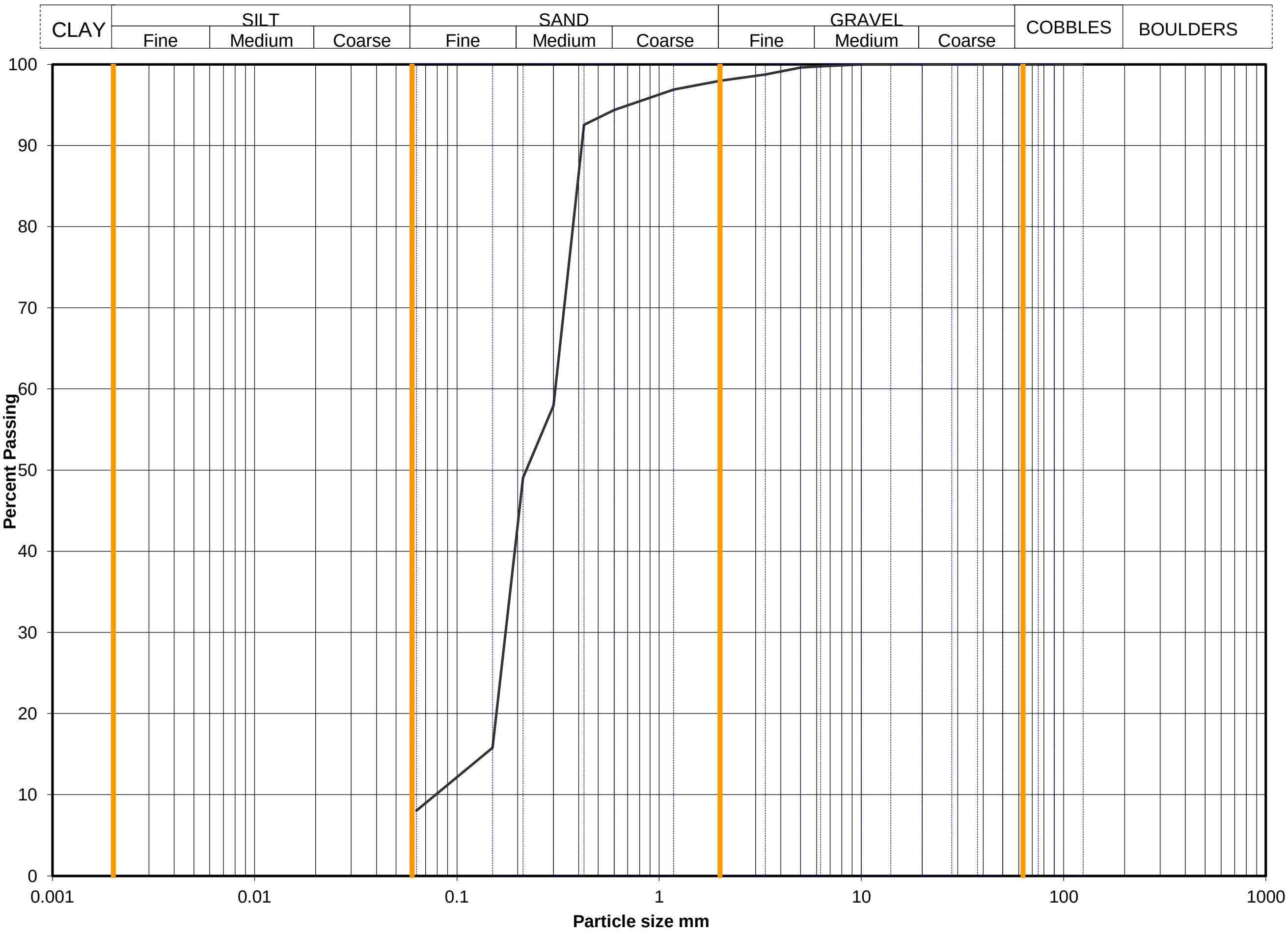
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP8
		Sample Depth (m BGL)	3.8
	A8015-18-20180410074504	Sample Type and No	D11
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	98		
1.18	97		
0.600	94		
0.425	93		
0.300	58	Dry mass of sample, kg	
0.212	49		
0.150	16	1.1	
0.063	8		

Soil description	Brown slightly gravelly silty SAND.
Preparation / Pretreatment	Sieve: natural material
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	90	90
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	8	8

Uniformity Coefficient	**D60 / D10**	4

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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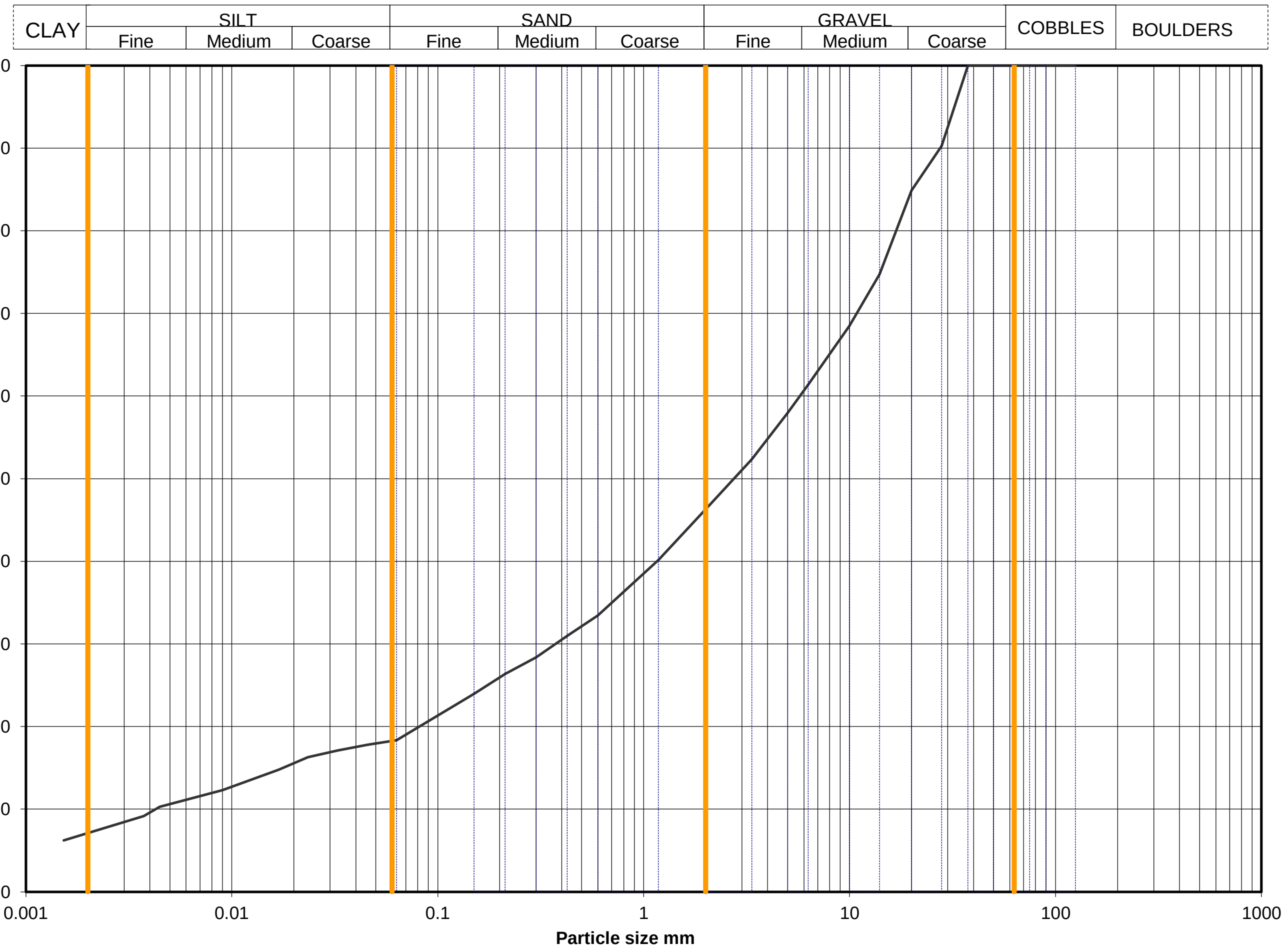
Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	A8015-18-20180410091457

Hole No	TP9
Sample Depth (m BGL)	0.3
Sample Type and No	D3
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	18
90	100	0.0457	18
75	100	0.0327	17
63	100	0.0234	16
50	100	0.0169	15
37.5	100	0.0090	12
28	90	0.0045	10
20	85	0.0037	9
14	75	0.0015	6
10	69		
6.3	61		
5.0	58		
3.35	52		
2.00	46		
1.18	40	Particle density, Mg/m3	
0.600	33		
0.425	31	2.65 assumed	
0.300	28	Dry mass of sample, kg	
0.212	26		
0.150	24	1.1	
0.063	18		

Soil description	Brown slightly sandy gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	54	54
	Sand	28	28
*<60mm values to aid description only	Silt	11	11
	Clay	7	7

Uniformity Coefficient	**D60 / D10**	1347

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

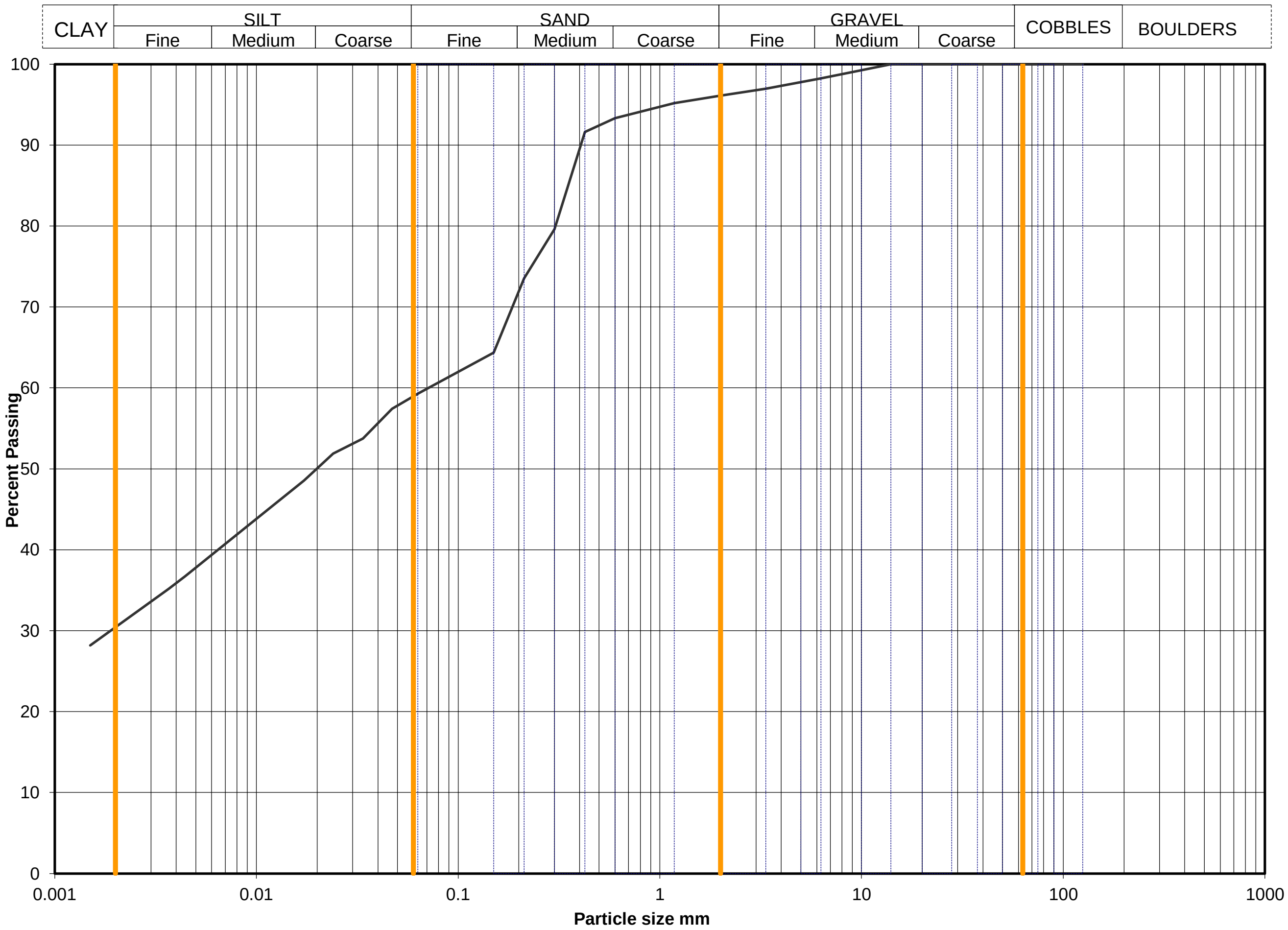
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-18-20180410091609	Hole No	TP9
		Sample Depth (m BGL)	2.00 - 2.20
		Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	59
90	100	0.0471	57
75	100	0.0338	54
63	100	0.0241	52
50	100	0.0172	49
37.5	100	0.0091	43
28	100	0.0044	37
20	100	0.0037	35
14	100	0.0015	28
10	99		
6.3	98		
5.0	98		
3.35	97		
2.00	96		
1.18	95	Particle density, Mg/m3	
0.600	93		
0.425	92	2.65 assumed	
0.300	80	Dry mass of sample, kg	
0.212	74		
0.150	64	10.4	
0.063	59		

Soil description	Brown slightly gravelly sandy silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	37	37
*<60mm values to aid description only	Silt	29	29
	Clay	30	30

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

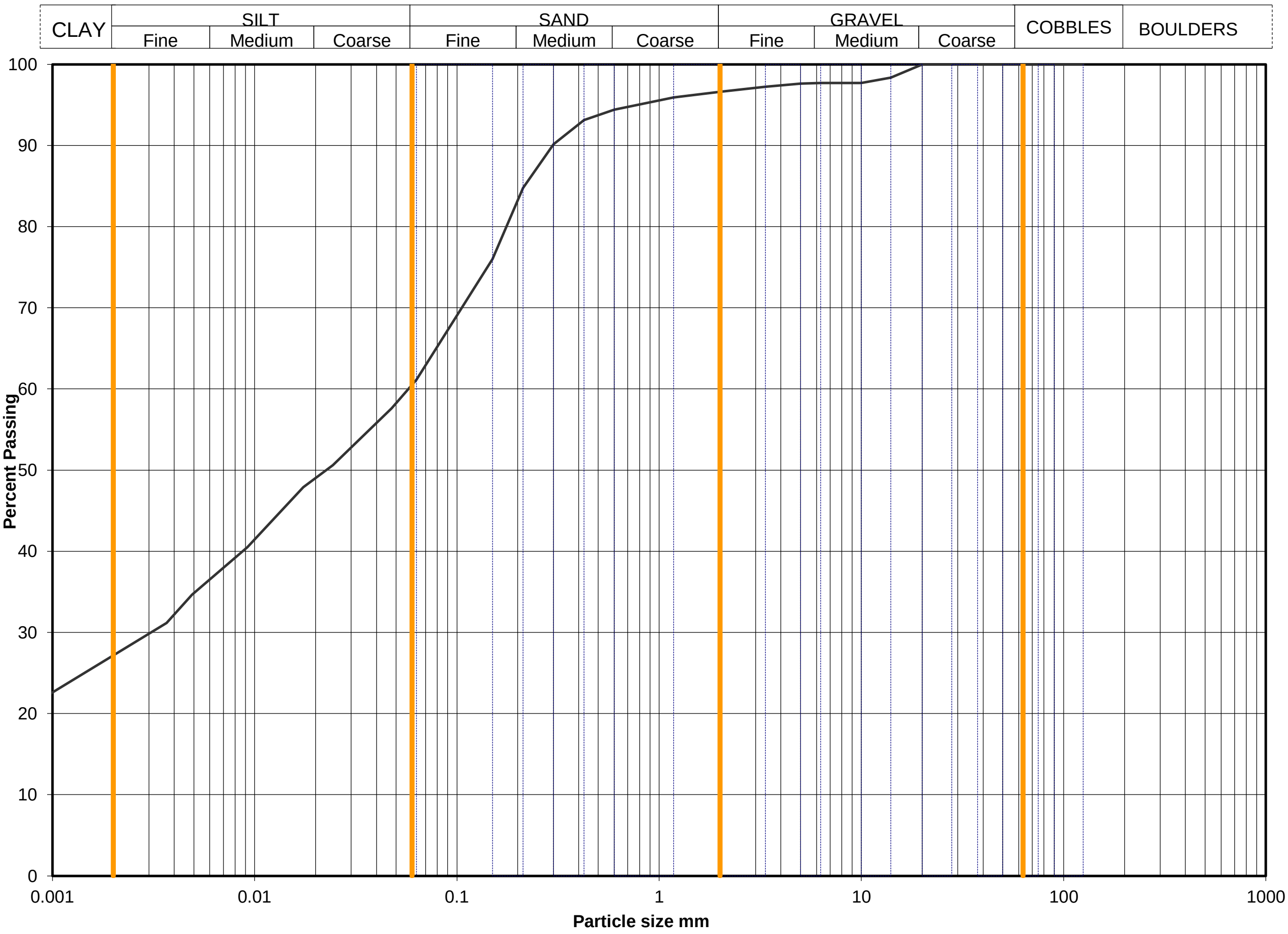
PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-18-20180413014845

Hole No	TT1
Sample Depth (m BGL)	2.20 - 2.30
Sample Type and No	B8
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	61
90	100	0.0476	58
75	100	0.0341	54
63	100	0.0244	51
50	100	0.0174	48
37.5	100	0.0092	40
28	100	0.0049	35
20	100	0.0037	31
14	98	0.0008	21
10	98		
6.3	98		
5.0	98		
3.35	97		
2.00	97		
1.18	96	Particle density, Mg/m3	
0.600	94		
0.425	93	2.65 assumed	
0.300	90	Dry mass of sample, kg	
0.212	85		
0.150	76	11.2	
0.063	61		

Soil description	Brown slightly gravelly sandy silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	35	35
*<60mm values to aid description only	Silt	34	34
	Clay	27	27

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

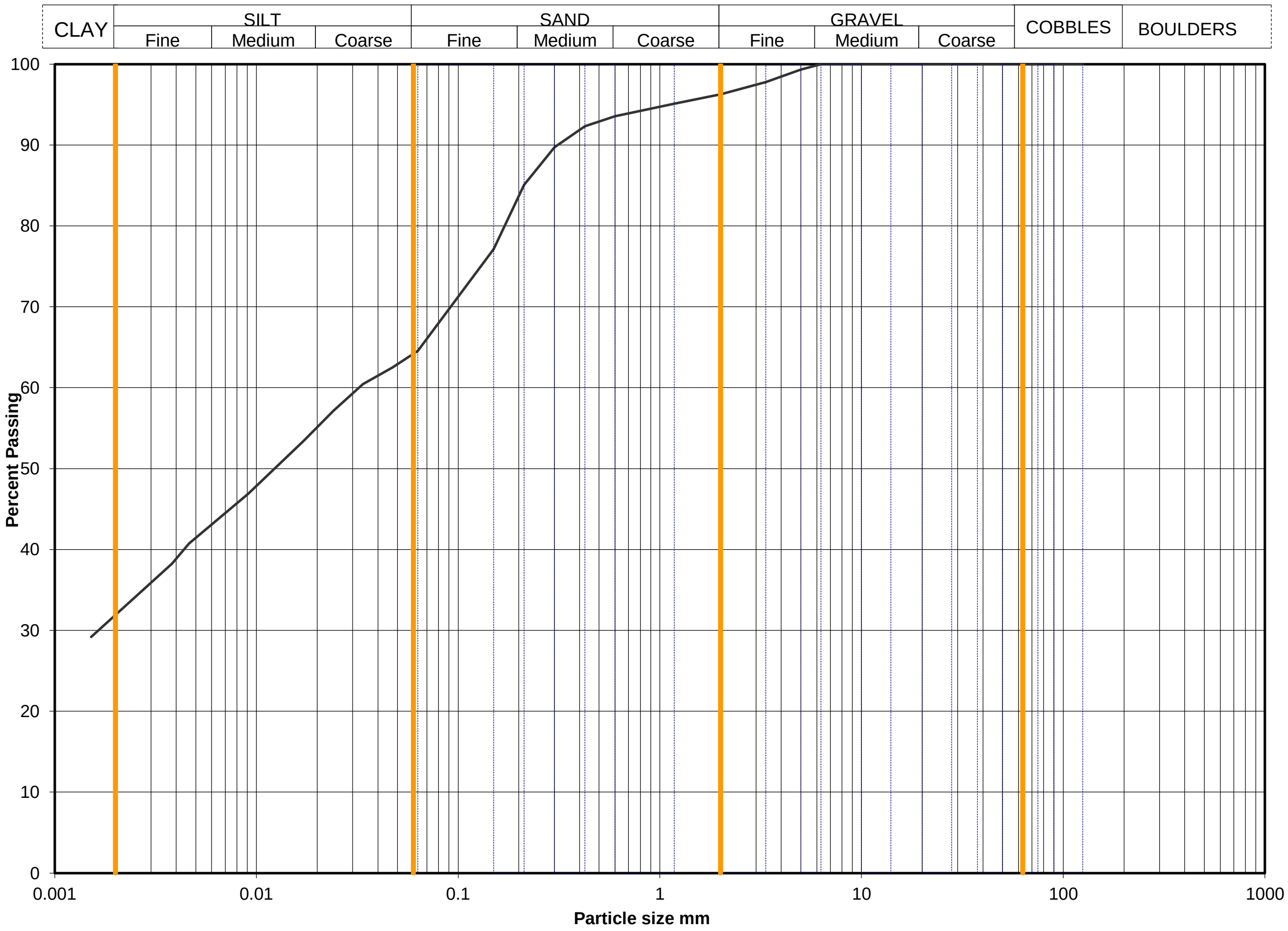
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID: A8015-18-20180408083410	Hole No	TT2
		Sample Depth (m BGL)	1.00 - 1.25
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	65
90	100	0.0473	63
75	100	0.0337	60
63	100	0.0241	57
50	100	0.0172	53
37.5	100	0.0091	47
28	100	0.0046	41
20	100	0.0038	38
14	100	0.0015	29
10	100		
6.3	100		
5.0	99		
3.35	98		
2.00	96		
1.18	95	Particle density, Mg/m3	
0.600	94		
0.425	92	2.65	assumed
0.300	90	Dry mass of sample, kg	
0.212	85		
0.150	77	13.9	
0.063	65		

Soil description	Brown slightly sandy slightly gravelly silty CLAY with rootlets.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	4	4
	Sand	32	32
*<60mm values to aid description only	Silt	33	33
	Clay	32	32

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

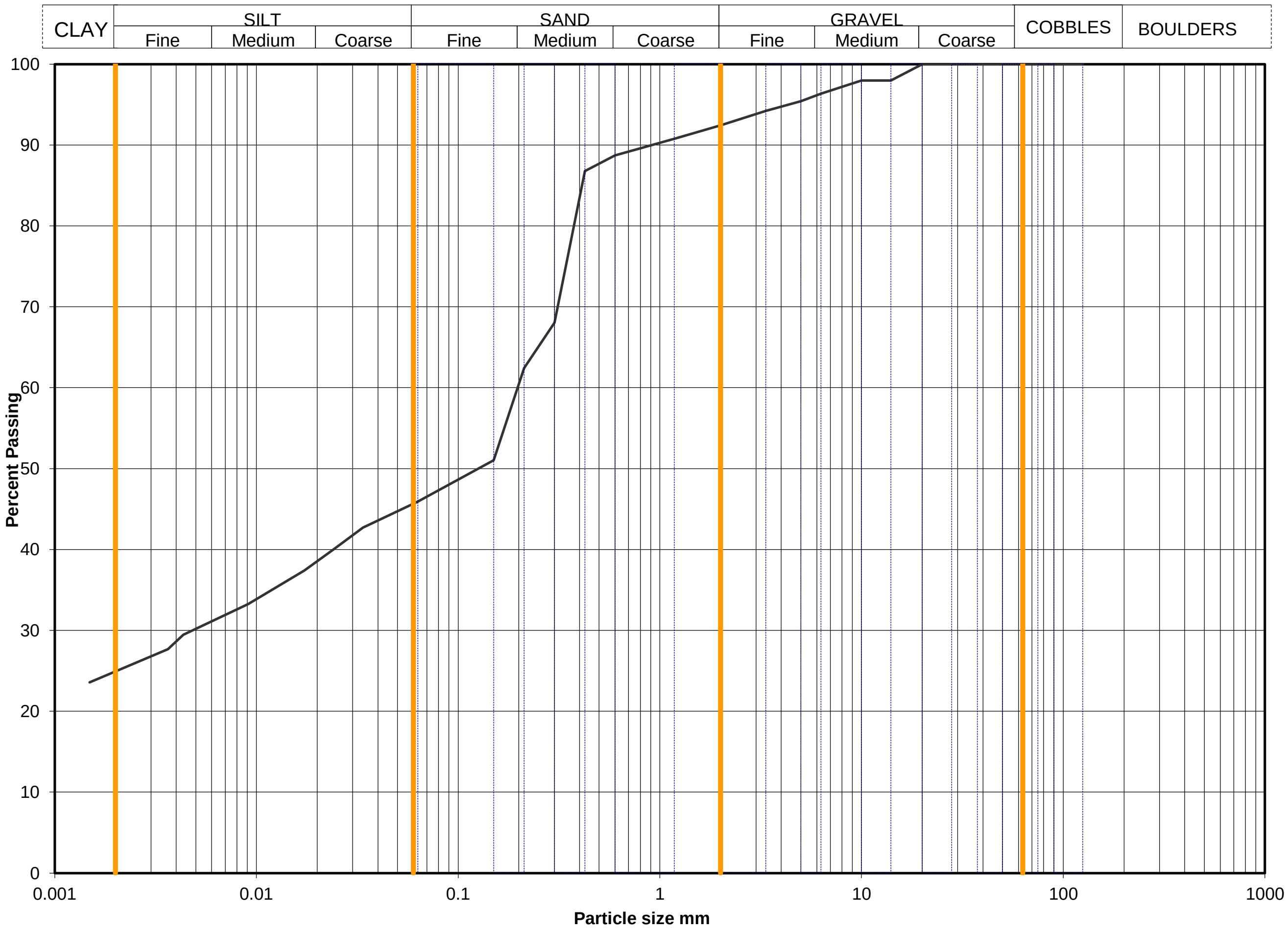
Figure

PSD

Printed: 05/07/2018 11:36

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TT2
	A8015-18-20180408083738	Sample Depth (m BGL)	3.25 - 3.50
		Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	46
90	100	0.0474	44
75	100	0.0338	43
63	100	0.0242	40
50	100	0.0173	37
37.5	100	0.0091	33
28	100	0.0043	29
20	100	0.0036	28
14	98	0.0015	24
10	98		
6.3	96		
5.0	95		
3.35	94		
2.00	92		
1.18	91	Particle density, Mg/m3	
0.600	89		
0.425	87	2.65	assumed
0.300	68	Dry mass of sample, kg	
0.212	62		
0.150	51		
0.063	46	14.0	

Soil description	Brown slightly gravelly sandy silty CLAY.
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	8	8
	Sand	46	46
*<60mm values to aid description only	Silt	21	21
	Clay	25	25

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	Density		w	Test type	Dia.	ó3	At failure / end of stage				Membrane Thickness	Remarks
	No.	Depth (m)		type		bulk	dry					Axial strain	ó1 - ó	cu	MODE		
		from	to			Mg/m3		%		mm	kPa	%	kPa	kPa		mm	
BH1	15	5.00	5.45	UT	Stiff greyish brown slightly sandy slightly gravelly CLAY.	2.21	1.93	15	UUM	99.4 99.4 99.4	100 200 400	11.4 13.4 18.8	203 216 229	101 108 114	P	0.4	
BH1	20	8.00	8.45	UT	Firm greyish brown slightly sandy slightly gravelly CLAY.	2.21	1.92	15	UUM	102.6 102.6 102.6	160 320 640	7.9 10.4 19.8	110 127 163	55 64 82	P	0.4	
BH1	35	17.00	17.45	UT	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is mainly chalk.	2.23	1.96	14	UUM	103.8	250	19.9	506	253	P	0.4	Sample reached 20% axial strain during 1st stage.
BH1	39	20.00	20.40	UT	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is chalk.	2.2	1.92	14	UUM UUM	103.6 103.6	250 500	18.4 19.9	524 535	262 268	P	0.4	Sample reached 20% axial strain during 2nd stage.
BH2	7	1.20	1.65	UT	Firm stiff brown slightly sandy slightly gravelly CLAY	2.05	1.71	20	UUM	103.9 103.9 103.9	25 50 100	7.9 9.8 19.1	166 180 213	83 90 106	P	0.4	
BH2	28	5.10	5.55	UT	Firm dark brown slightly sandy slightly gravelly CLAY.	2.16	1.86	16	UUM	102.7 102.7 102.7	100 200 400	2.5 4.5 19.8	33 43 66	17 22 33	P	0.4	
BH2	44	11.00	11.45	UT	Stff greyish brown slightly sandy slightly gravelly CLAY.	2.2	1.91	15	UUM	102.8 102.8 102.8	220 440 880	10.9 12.9 19.9	217 225 254	109 113 127	P	0.4	
BH3	19	9.00	9.45	UT	Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel contains chalk fragments.	2.12	1.81	17	UUMR	102.9 102.9 102.9	180 360 720	5.0 6.9 19.8	81 89 113	41 45 56	P	0.4	
BH4	10	4.50	4.95	UT	Firm to stiff greyish brown slightly sandy slightly gravelly CLAY.	2.19	1.91	14	UUM	102.6 102.6 102.6	90 180 360	10.4 12.3 19.7	220 229 246	110 114 123	P	0.4	
BH4	22	9.00	9.45	UT	Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel contains chalk fragments.	2.16	1.87	15	UUM	95.9 95.9 95.9	180 360 720	5.4 6.9 19.7	100 108 148	50 54 74	P	0.4	
BH5	11	2.30	2.75	UT	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is chalk fragments.	2.14	1.84	16	UUM	102.5 102.5 102.5	45 90 180	16.3 18.8 19.8	537 541 542	268 270 271	P	0.4	
BH5	27	8.00	8.45	UT	Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel contains chalk.	2.19	1.89	16	UUM	101.9 101.9 101.9	160 320 640	4.0 5.9 18.8	69 83 115	35 41 58	P	0.4	
BH6	6	2.00	2.45	UT	Very stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel contains chalk.	2.13	1.82	17	UUM	102.7 102.7 102.7	40 80 160	10.9 12.4 19.8	446 452 480	223 226 240	P	0.4	
BH6	14	6.00	6.45	UT	Firm to stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel contains chalk.	2.2	1.91	15	UUM	102.5 102.5 102.5	120 240 480	4.0 6.4 19.3	109 134 174	54 67 87	P	0.4	

General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. Latex rubber membrane used and membrane correction applied in accordance with BS1377-7 8.5.1.4 unless stated.

Legend	UU - single stage test (may be in sets of specimens)	ó3	cell pressure	Mode of failure	P	plastic
	UUM - multistage test on a single specimen	ó1 - ó3	deviator stress		B	brittle
	suffix R - remoulded or recompacted	cu	undrained shear strength		C	compound

QA Ref
SLR 2
Rev 2.7
Apr 15

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Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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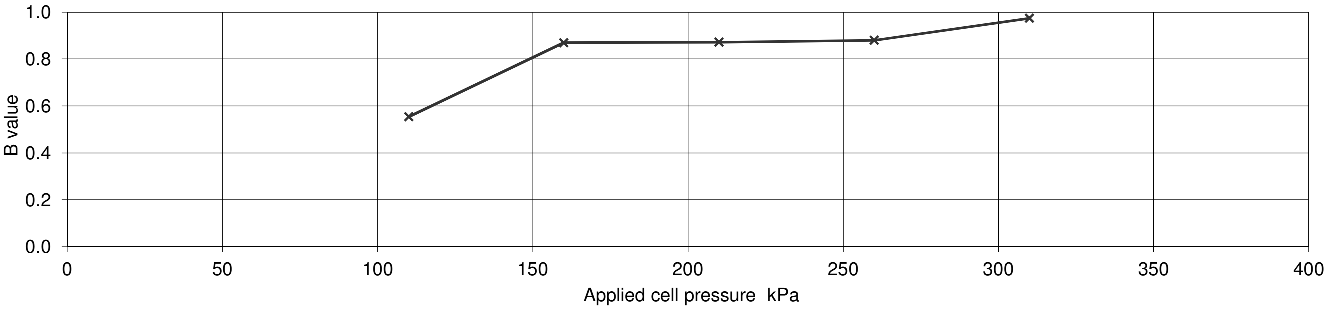
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH1
Project Name	IMMINGHAM		Depth (m BGL)	1.20 - 1.65
			No	6
			Type	UT
			ID	
			Spec Ref	

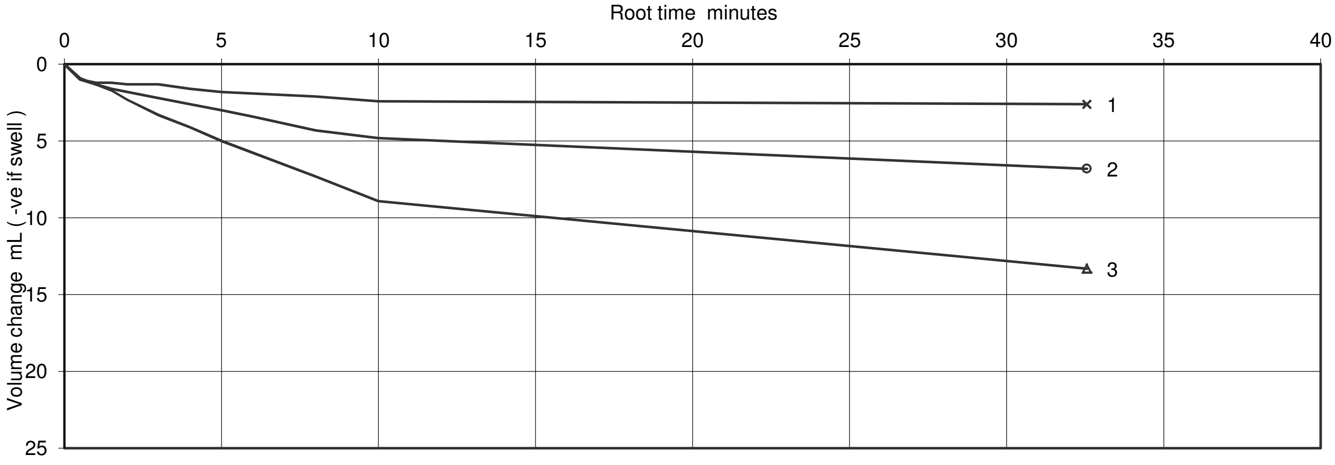
Specimen Details		
Initial		
Length	mm	203.24
Diameter	mm	103.57
Bulk Density	Mg/m³	2.10
Water Content	%	19
Dry density	Mg/m³	1.76
After test		
Bulk Density	Mg/m³	2.08
Water Content	%	20
Dry density	Mg/m³	1.73

Soil Description	Firm brown slightly sandy slightly gravelly CLAY
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	293.8
Final B Value		0.97



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		312	325	350	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		12	25	50	kPa
	Pore pressure at start of consolidation		303	308	324	kPa
	Pore pressure at end of consolidation		301	300	300	kPa
	Pore pressure dissipation at end of consolidation		70	95	100	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	2.12	1.17	1.08	m^2/year
	Coefficient of Compressibility	M_{vi}	0.67	0.48	0.32	m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	4.4E-10	1.7E-10	1.1E-10	m/s

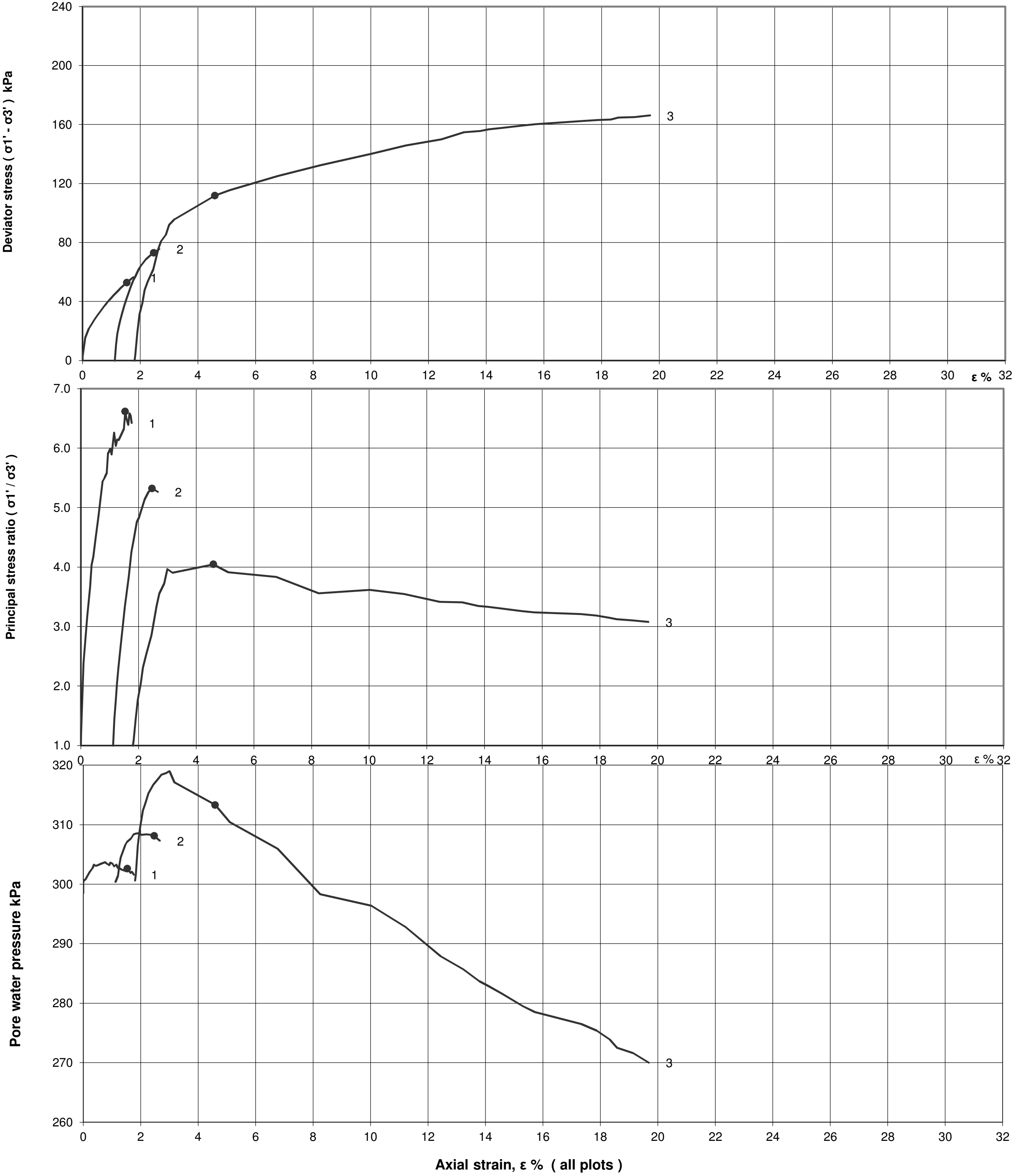


Ref			**Figure**
SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:42	**CUM** sheet 1 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH1		
Project Name	IMMINGHAM		Depth (m BGL)	1.20 - 1.65		
			No	6	Type	UT
			ID			
			Spec Ref			

Shearing stages - graphical data

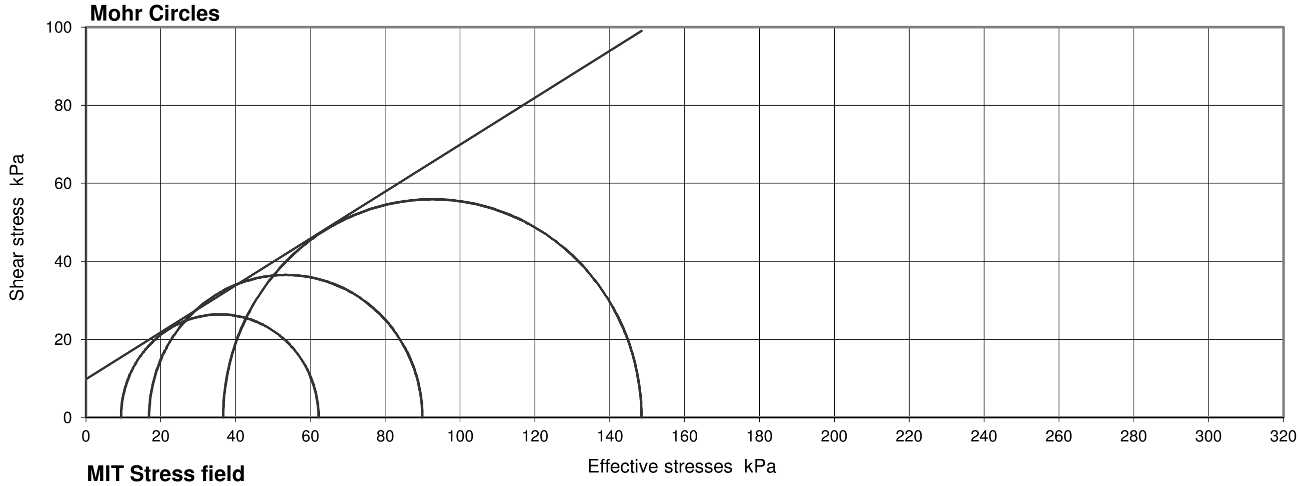


Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:42	**Figure** **CUM** sheet 2 of 3

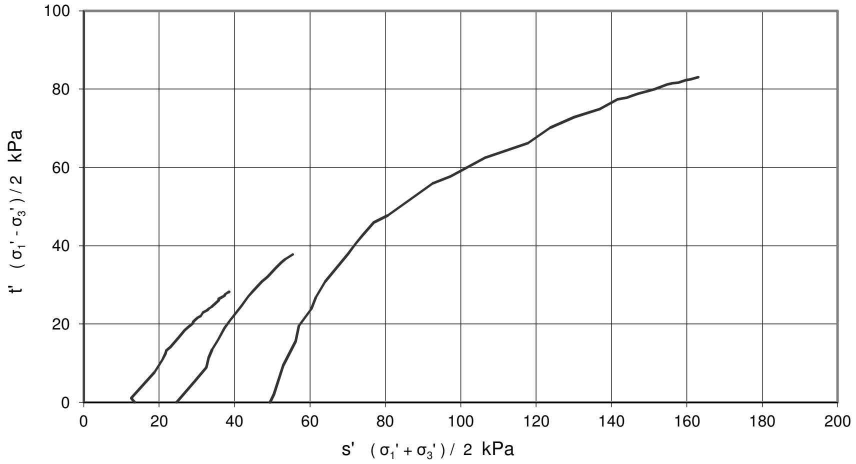
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH1		
Project Name	IMMINGHAM		Depth (m BGL)	1.20 - 1.65		
			No	6	Type	UT
			ID			
			Spec Ref			

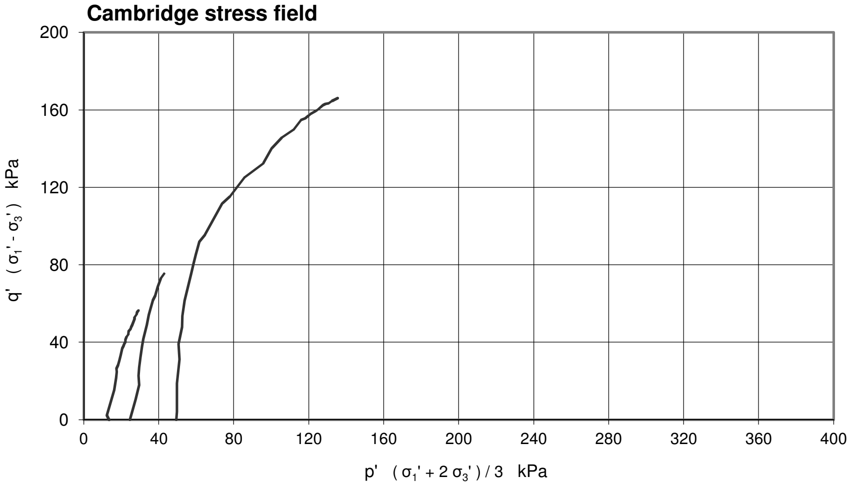
Mohr Circles



MIT Stress field



Cambridge stress field



Compression stages

Stage	1	2	3	
Cell pressure	312	325	350	kPa
Initial pwp	299	300	301	kPa
Initial σ_3'	14	25	49	kPa
Rate of strain	1.51	1.51	1.51	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
Axial strain	1.54	2.47	4.60	%
$(\sigma_1' / \sigma_3')_f$	6.616	5.321	4.046	
$(\sigma_1' - \sigma_3')_f$	52.8	73.0	111.8	kPa
u_f	303	308	313	kPa
$\sigma_3'{}_f$	9	17	37	kPa
$\sigma_1'{}_f$	62	90	148	kPa
A_f	0.08	0.11	0.11	
Time to failure	1.0	1.6	3.0	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c '	kPa	9.8
Ø '	degrees	31.0
		Manual re-assessment
c '	kPa	-
Ø '	degrees	-

Mode of failure

Notes : Deviator stresses corrected for area change, vertical side drains and 0.594 mm thick rubber membrane(s)

Ref

SLR8.1
Rev 86.0
Feb18

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1157

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Figure

CUM

sheet 3 of 3

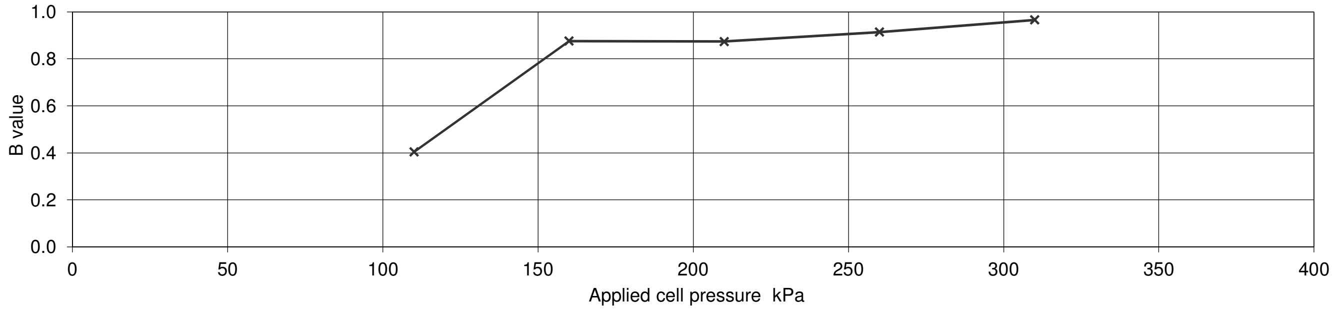
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH2		
Project Name	IMMINGHAM		Depth (m BGL)	3.30 - 3.75		
			No	15	Type	UT
			ID			
			Spec Ref			

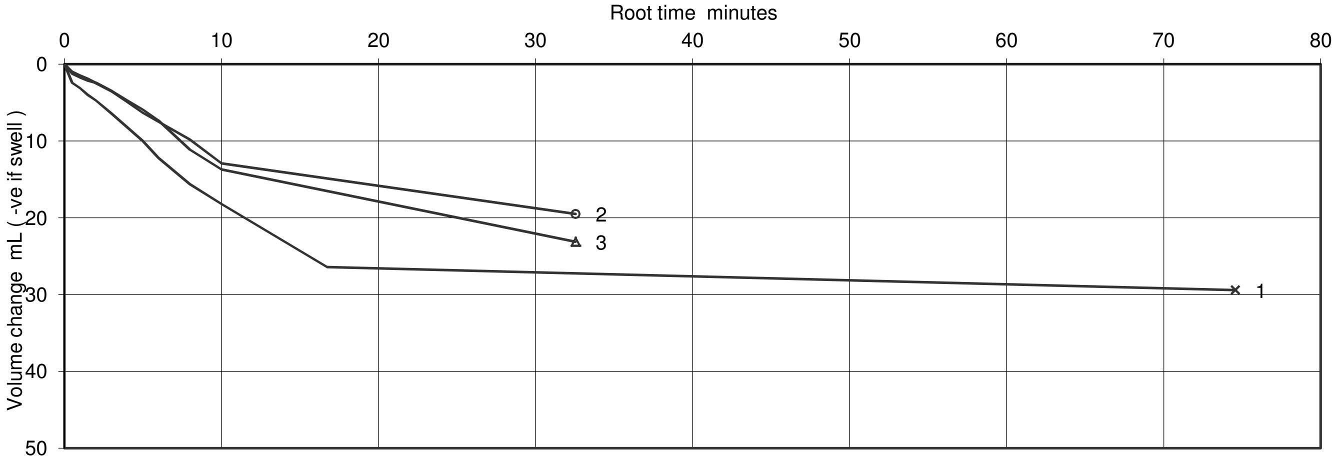
Specimen Details		
Initial		
Length	mm	202.89
Diameter	mm	103.07
Bulk Density	Mg/m³	2.03
Water Content	%	25
Dry density	Mg/m³	1.63
After test		
Bulk Density	Mg/m³	2.04
Water Content	%	24
Dry density	Mg/m³	1.64

Soil Description	Firm brown laminated slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	300
Final B Value		0.97



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		355	410	520	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		55	110	220	kPa
	Pore pressure at start of consolidation		348	365	419	kPa
	Pore pressure at end of consolidation		301	301	302	kPa
	Pore pressure dissipation at end of consolidation		97	99	98	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.97	0.94	0.93	m^2/year
	Coefficient of Compressibility	M_{vi}	0.36	0.18	0.12	m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.1E-10	5.1E-11	3.3E-11	m/s

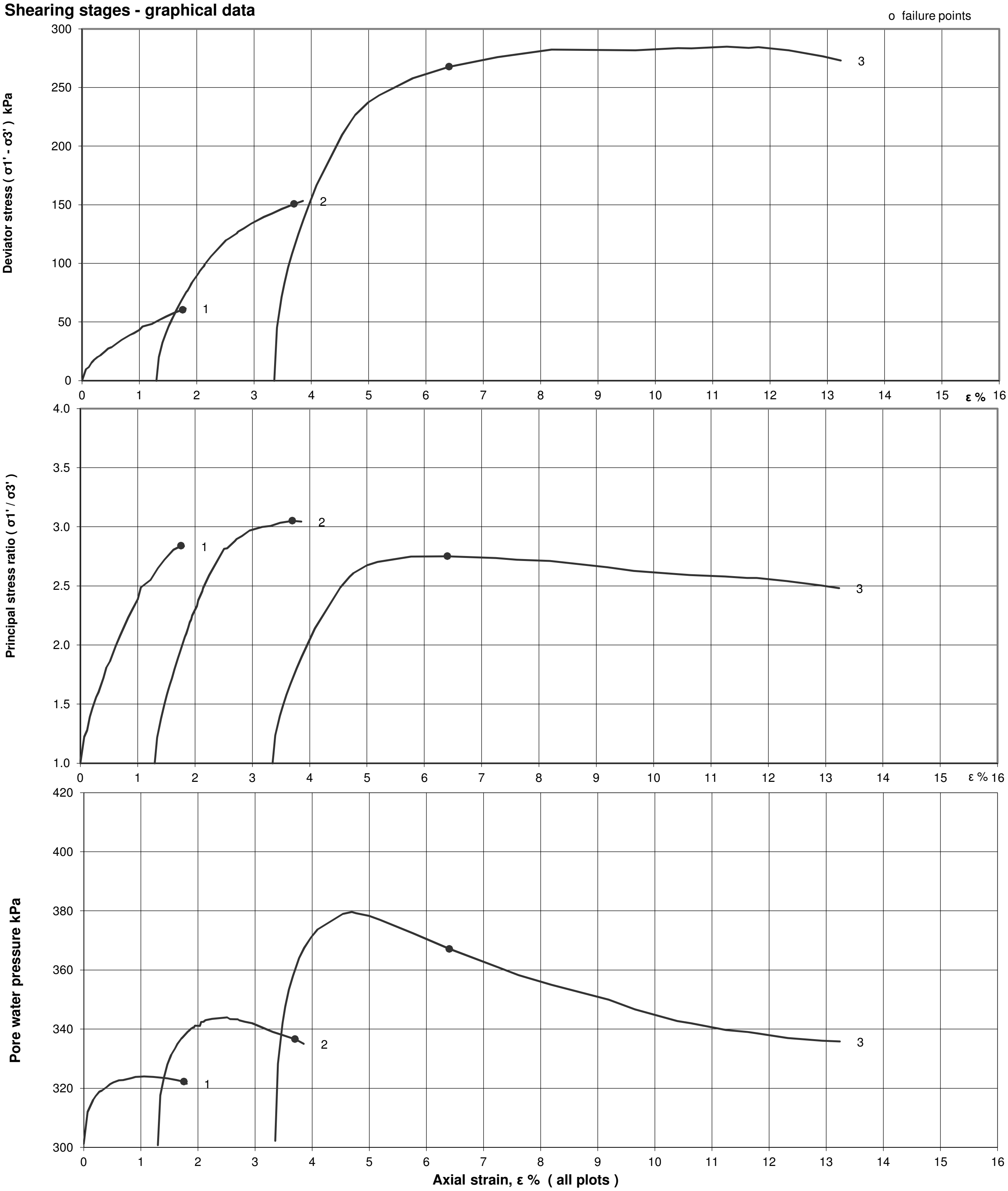


Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:43	**Figure** **CUM** sheet 1 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No		BH2		
Project Name	IMMINGHAM		Depth (m BGL)		3.30 - 3.75		
			No	15		Type	UT
			ID				
			Spec Ref				

Shearing stages - graphical data

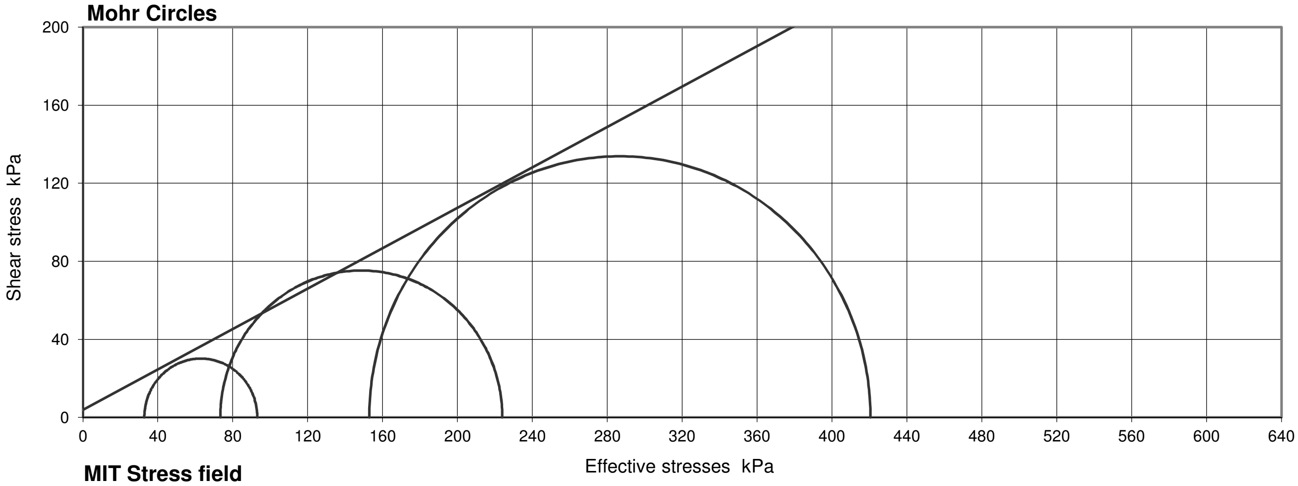


Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:43	**Figure** **CUM** sheet 2 of 3

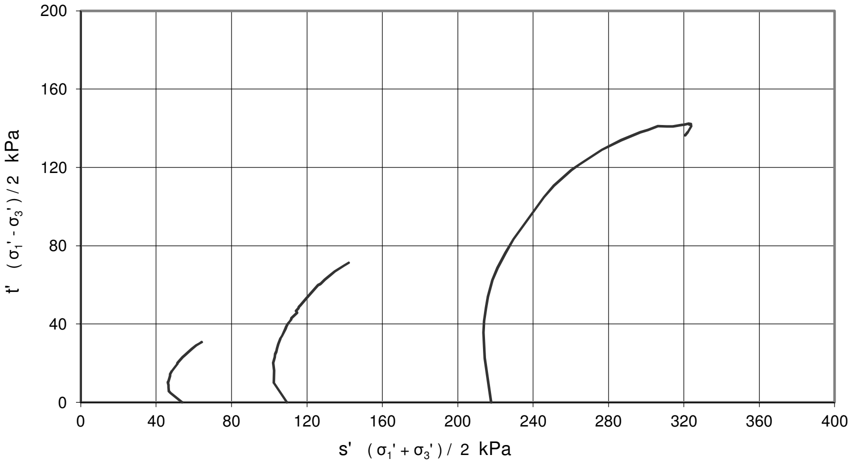
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH2		
Project Name	IMMINGHAM		Depth (m BGL)	3.30 - 3.75		
			No	15	Type	UT
			ID			
			Spec Ref			

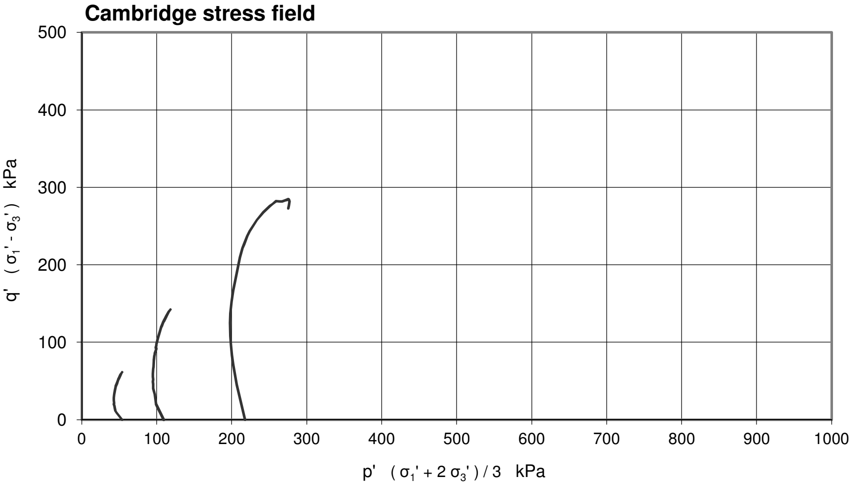
Mohr Circles



MIT Stress field



Cambridge stress field



Compression stages

Stage	1	2	3	
Cell pressure	355	410	520	kPa
Initial pwp	301	301	302	kPa
Initial σ_3'	54	109	218	kPa
Rate of strain	0.71	0.71	0.71	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
Axial strain	1.76	3.70	6.40	%
$(\sigma_1' / \sigma_3')_f$	2.839	3.051	2.751	
$(\sigma_1' - \sigma_3')_f$	60.3	150.5	267.7	kPa
u_f	322	337	367	kPa
$\sigma_3'{}_f$	33	73	153	kPa
$\sigma_1'{}_f$	93	224	421	kPa
A_f	0.35	0.24	0.24	
Time to failure	2.5	5.2	9.0	hrs

Shear Strength Parameters
at peak stress ratio

		Linear regression
c '	kPa	3.8
Ø '	degrees	27.4
		Manual re-assessment
c '	kPa	-
Ø '	degrees	-

Mode of failure

Notes : Deviator stresses corrected for area change, vertical side drains and 0.594 mm thick rubber membrane(s)

Ref			Figure
SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:43	CUM sheet 3 of 3

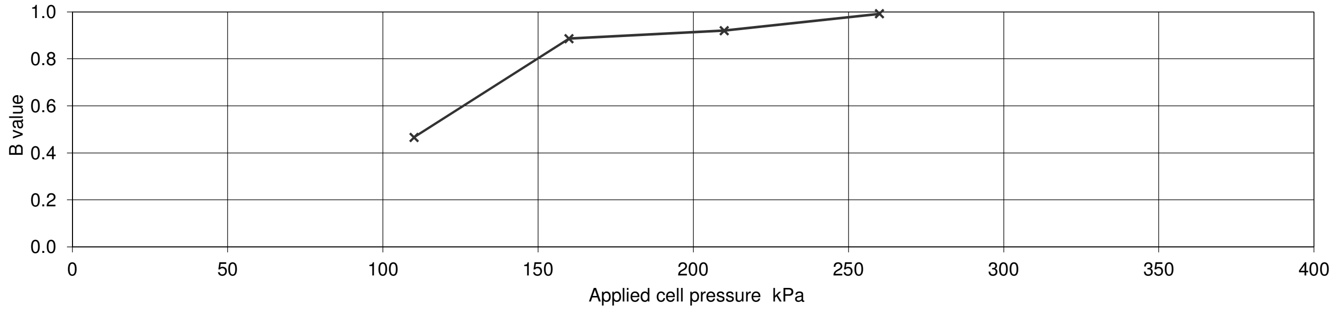
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH3		
Project Name	IMMINGHAM		Depth (m BGL)	5 - 5.45		
			No	10	Type	UT
			ID			
			Spec Ref			

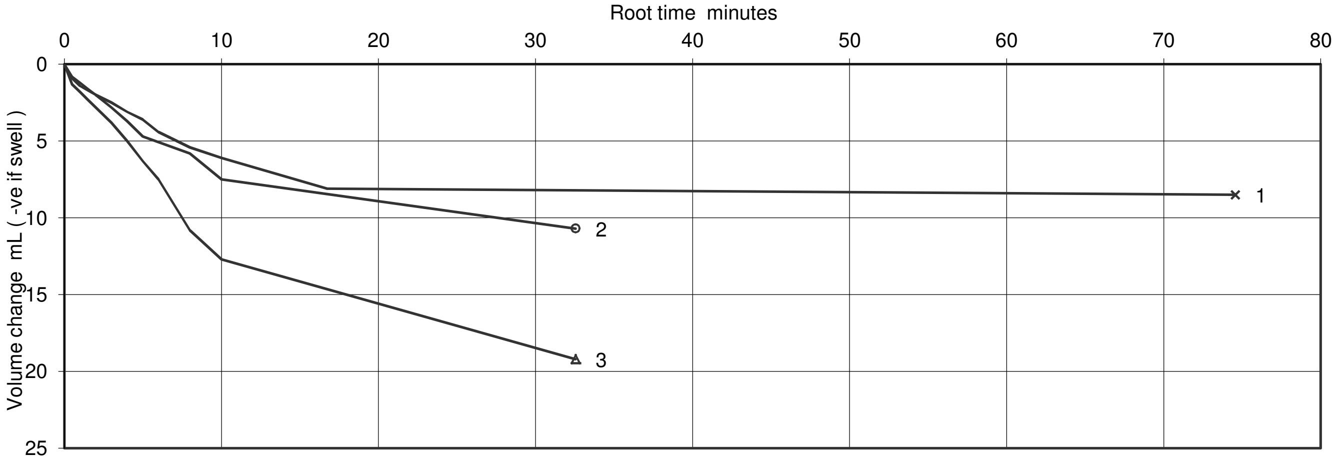
Specimen Details		
Initial		
Length	mm	203.48
Diameter	mm	102.37
Bulk Density	Mg/m³	2.19
Water Content	%	20
Dry density	Mg/m³	1.82
After test		
Bulk Density	Mg/m³	2.26
Water Content	%	16
Dry density	Mg/m³	1.94

Soil Description	Firm brown slightly sandy slightly gravelly CLAY
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	260
Final pore water pressure	kPa	237.3
Final B Value		0.99



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		335	370	440	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		35	70	140	kPa
	Pore pressure at start of consolidation		314	327	383	kPa
	Pore pressure at end of consolidation		300	300	302	kPa
	Pore pressure dissipation at end of consolidation		100	100	98	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	1.30	0.95	0.84	m^2/year
	Coefficient of Compressibility	M_{vi}	0.39	0.25	0.15	m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.6E-10	7.4E-11	3.9E-11	m/s



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SLR8.1
Rev 86.0
Feb18

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Printed:20/07/2018 10:43

Figure

CUM

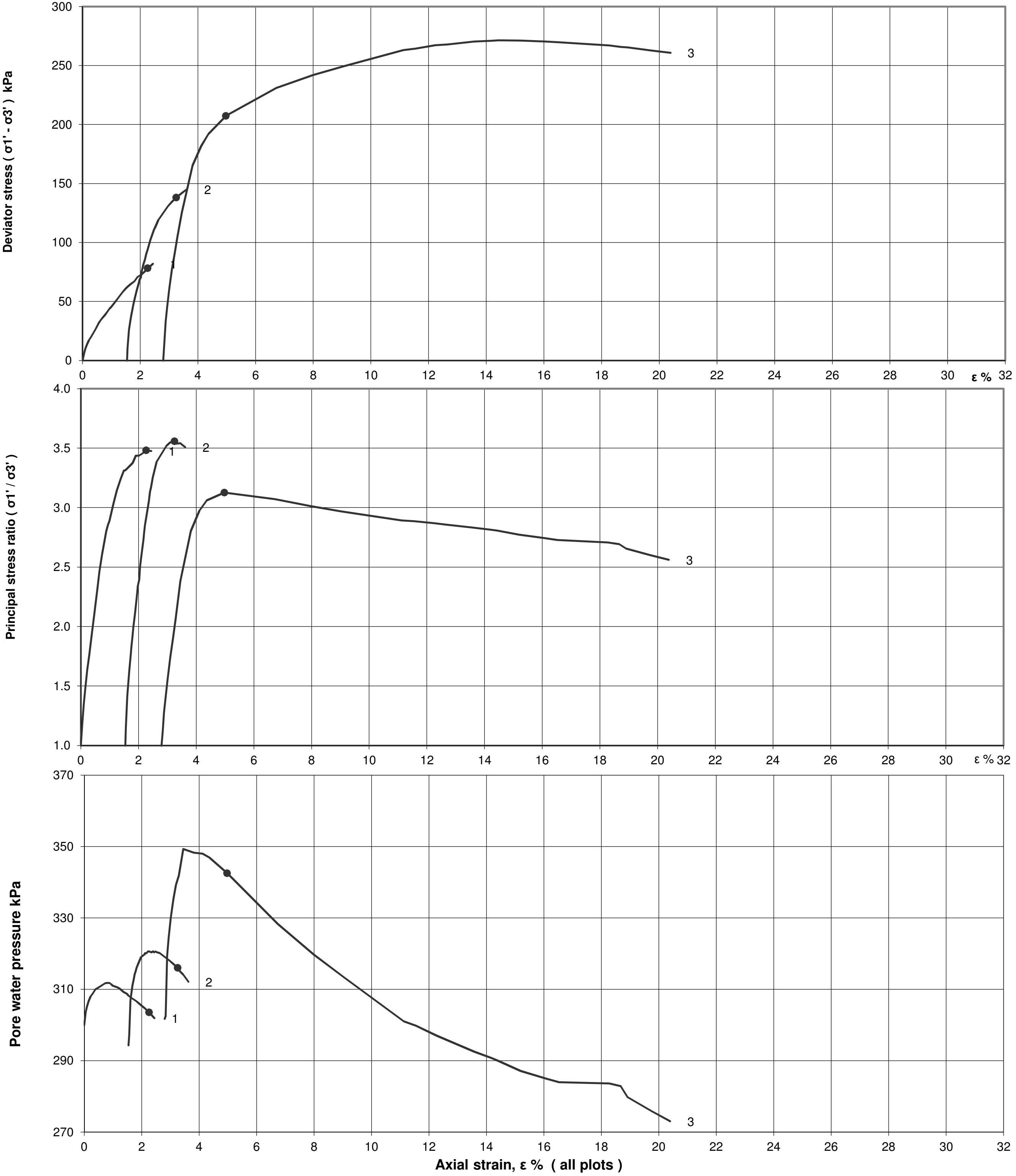
sheet 1 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH3		
Project Name	IMMINGHAM		Depth (m BGL)	5 - 5.45		
			No	10	Type	UT
			ID			
			Spec Ref			

Shearing stages - graphical data

o failure points

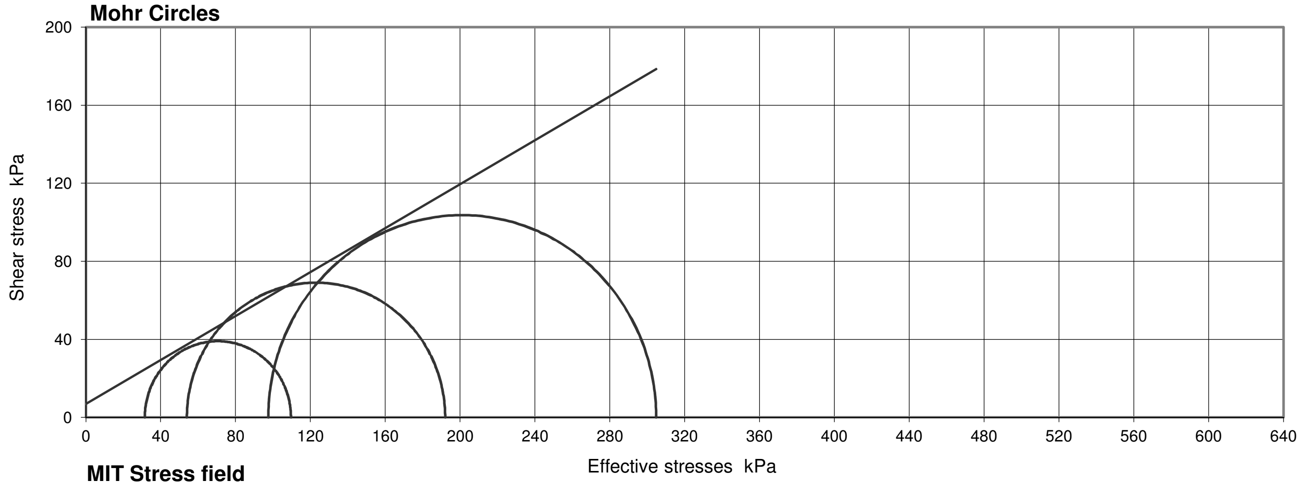


Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:43	**Figure** **CUM** sheet 2 of 3

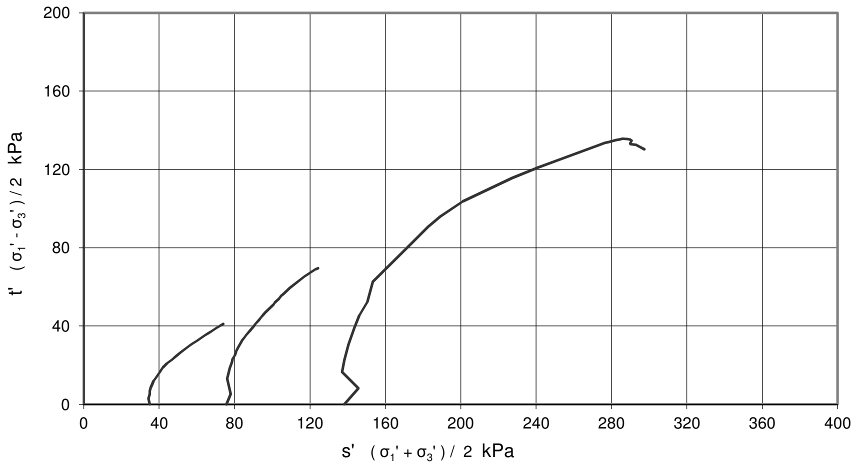
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH3		
Project Name	IMMINGHAM		Depth (m BGL)	5 - 5.45		
			No	10	Type	UT
			ID			
			Spec Ref			

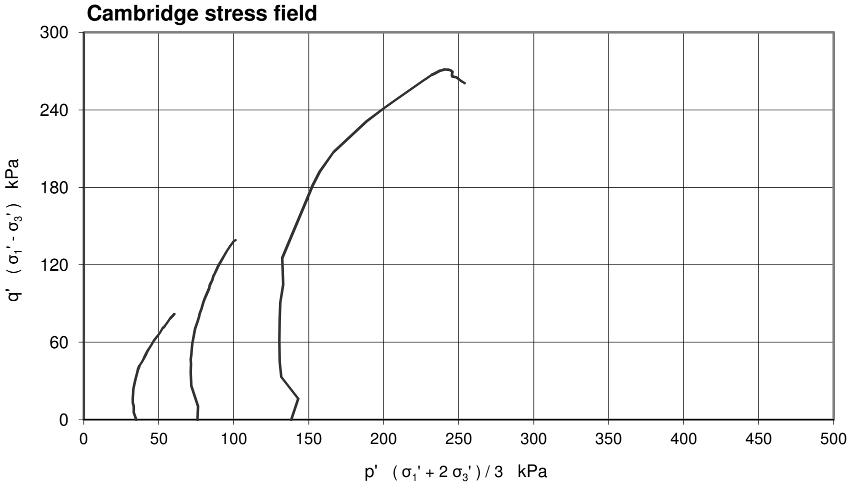
Mohr Circles



MIT Stress field



Cambridge stress field



Compression stages

Stage	1	2	3	
Cell pressure	335	370	440	kPa
Initial pwp	300	294	302	kPa
Initial σ_3'	35	76	138	kPa
Rate of strain	1.02	1.02	1.02	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
Axial strain	2.26	3.25	4.98	%
$(\sigma_1' / \sigma_3')_f$	3.480	3.556	3.126	
$(\sigma_1' - \sigma_3')_f$	78.1	138.0	207.3	kPa
u_f	304	316	343	kPa
$\sigma_3'{}_f$	32	54	98	kPa
$\sigma_1'{}_f$	110	192	305	kPa
A_f	0.04	0.16	0.20	
Time to failure	2.2	3.2	4.9	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c '	kPa	6.9
Ø '	degrees	29.4
		Manual re-assessment
c '	kPa	-
Ø '	degrees	-

Mode of failure

Notes : Deviator stresses corrected for area change, vertical side drains and 0.595 mm thick rubber membrane(s)

Ref

SLR8.1
Rev 86.0
Feb18

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1157

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Figure

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sheet 3 of 3

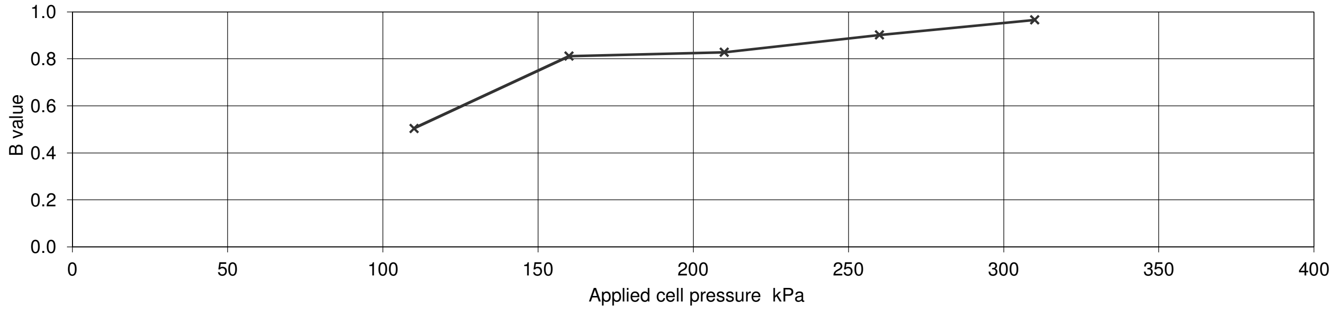
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH4		
Project Name	IMMINGHAM		Depth (m BGL)	7.50 - 7.95		
			No	18	Type	UT
			ID			
			Spec Ref			

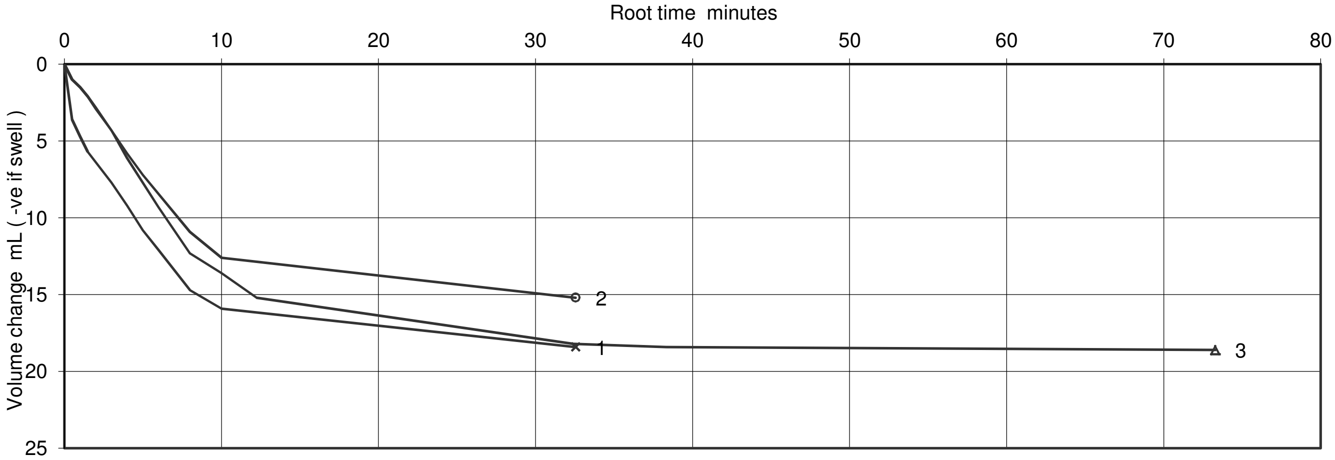
Specimen Details		
Initial		
Length	mm	203.49
Diameter	mm	103.68
Bulk Density	Mg/m³	2.22
Water Content	%	14
Dry density	Mg/m³	1.95
After test		
Bulk Density	Mg/m³	2.23
Water Content	%	13
Dry density	Mg/m³	1.97

Soil Description	Firm brown slightly sandy slightly gravelly CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	287.6
Final B Value		0.97



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		365	430	560	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		65	130	260	kPa
	Pore pressure at start of consolidation		347	374	457	kPa
	Pore pressure at end of consolidation		303	300	302	kPa
	Pore pressure dissipation at end of consolidation		94	100	99	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	2.17	2.09	1.63	m^2/year
	Coefficient of Compressibility	M_{vi}	0.24	0.12	0.07	m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	1.6E-10	7.7E-11	3.5E-11	m/s

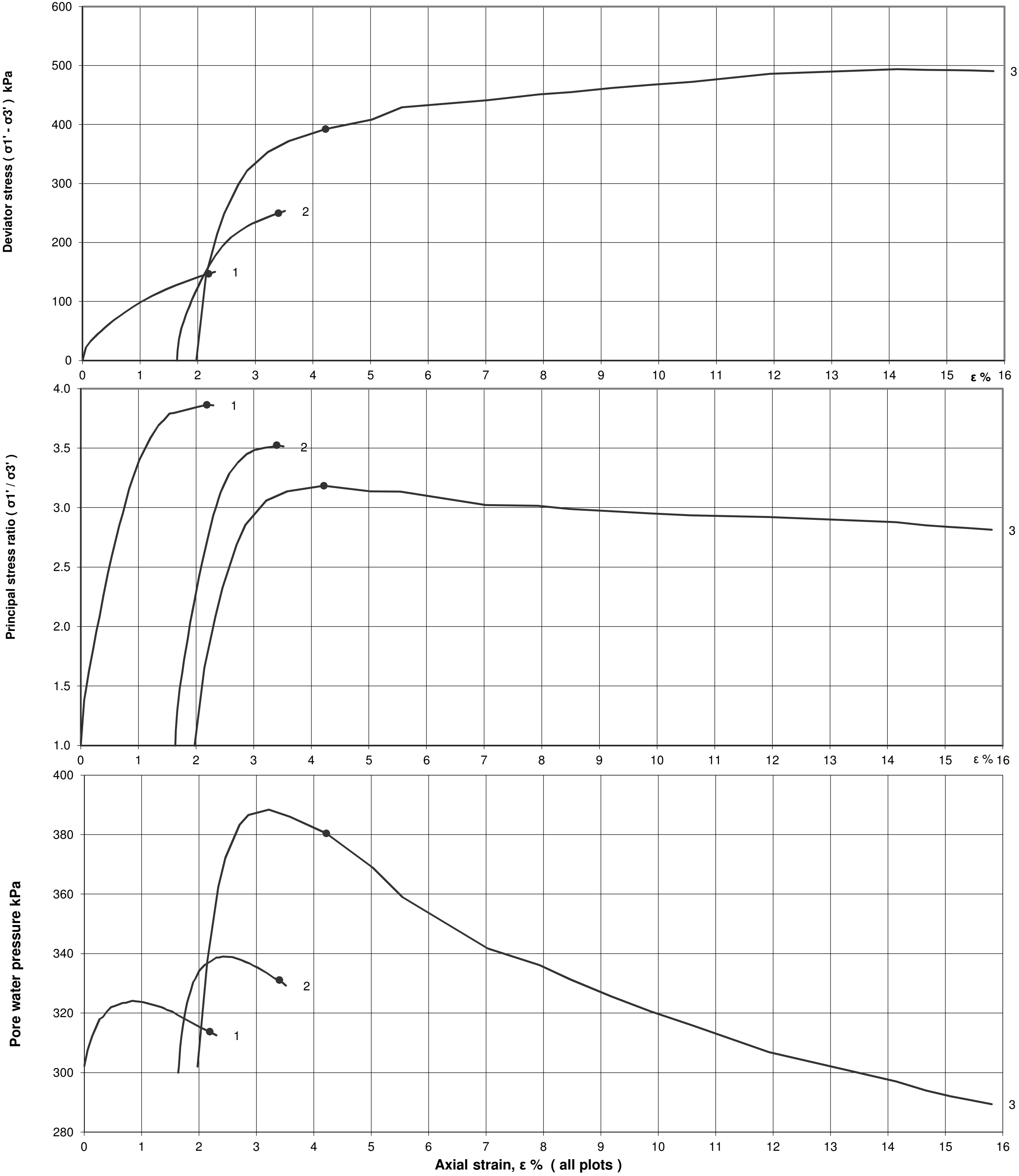


Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:44	**Figure** **CUM** sheet 1 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH4		
Project Name	IMMINGHAM		Depth (m BGL)	7.50 - 7.95		
			No	18	Type	UT
			ID			
			Spec Ref			

Shearing stages - graphical data

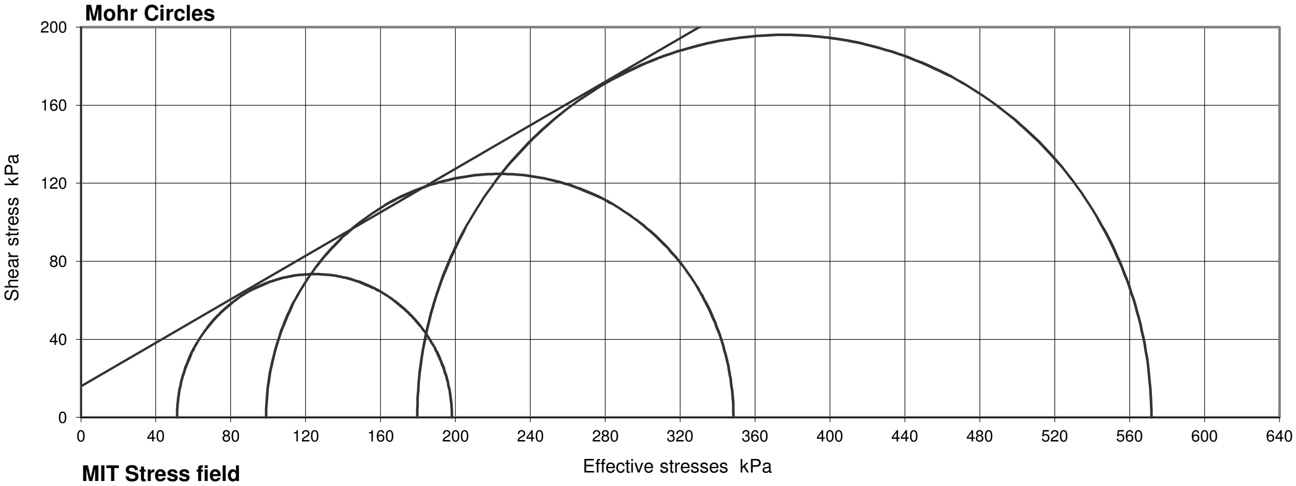


Ref SLR8.1 Rev 86.0 Feb18	1157	Printed:20/07/2018 10:44	**Figure** **CUM** sheet 2 of 3

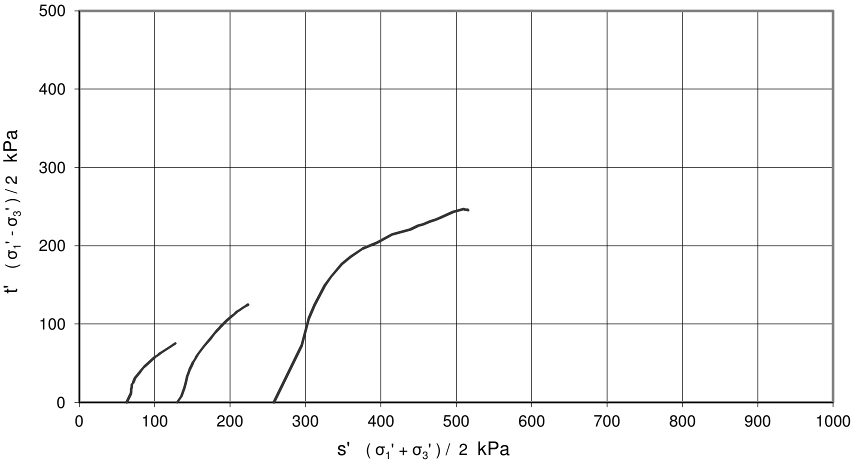
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH4	
Project Name	IMMINGHAM		Depth (m BGL)	7.50 - 7.95	
			No	18	Type: UT
			ID		
			Spec Ref		

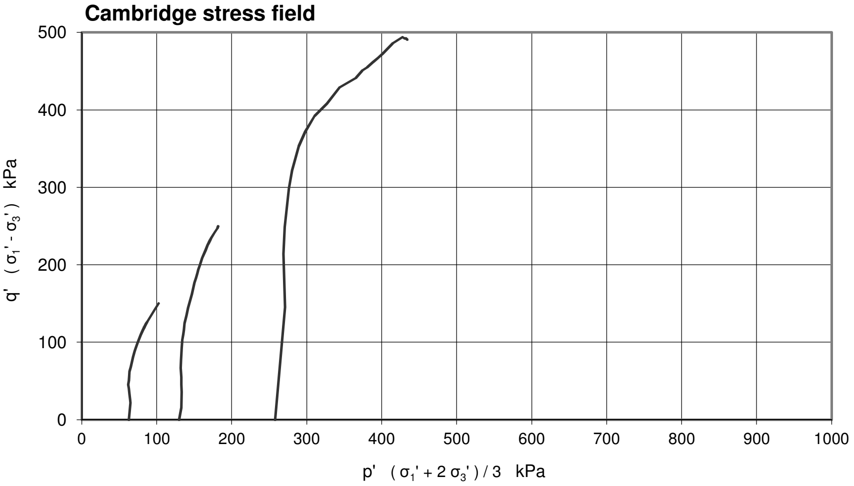
Mohr Circles



MIT Stress field



Cambridge stress field



Compression stages

Stage	1	2	3	
Cell pressure	365	430	560	kPa
Initial pwp	302	300	302	kPa
Initial σ_3'	63	130	258	kPa
Rate of strain	1.56	1.56	1.56	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
Axial strain	2.19	3.40	4.22	%
$(\sigma_1' / \sigma_3')_f$	3.863	3.523	3.183	
$(\sigma_1' - \sigma_3')_f$	146.9	249.6	392.0	kPa
u_f	314	331	380	kPa
$\sigma_3'{}_f$	51	99	180	kPa
$\sigma_1'{}_f$	198	348	572	kPa
A_f	0.08	0.12	0.20	
Time to failure	1.4	2.2	2.7	hrs

Shear Strength Parameters
at peak stress ratio

		Linear regression
c '	kPa	15.9
Ø '	degrees	29.1
		Manual re-assessment
c '	kPa	-
Ø '	degrees	-

Mode of failure

Notes : Deviator stresses corrected for area change, vertical side drains and 0.596 mm thick rubber membrane(s)

Ref
SLR8.1
Rev 86.0
Feb18

SOCOTEC

UKAS TESTING
1157

Printed:20/07/2018 10:44

Figure
CUM
sheet 3 of 3

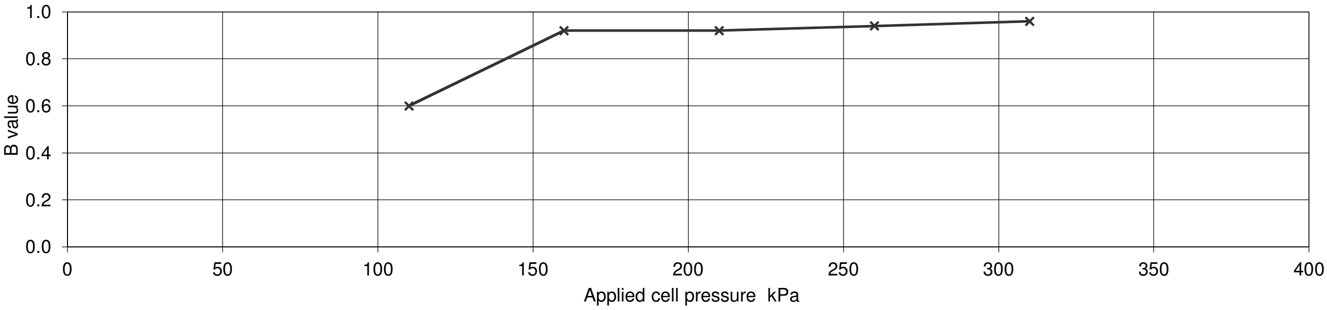
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH5		
Project Name	IMMINGHAM		Depth (m BGL)	11 - 11.45		
			No	35	Type	UT
			ID			
			Spec Ref			

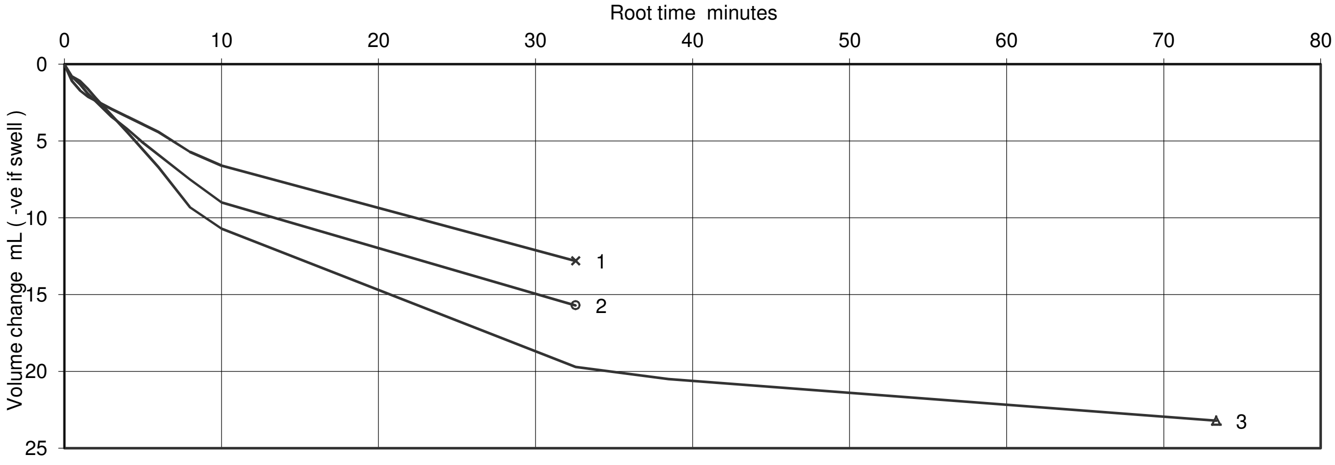
Specimen Details		
Initial		
Length	mm	203.00
Diameter	mm	103.08
Bulk Density	Mg/m³	2.16
Water Content	%	17
Dry density	Mg/m³	1.84
After test		
Bulk Density	Mg/m³	2.17
Water Content	%	17
Dry density	Mg/m³	1.85

Soil Description	Firm brown slightly sandy slightly gravelly CLAY
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	295
Final B Value		0.96



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		327	355	410	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		27	55	110	kPa
	Pore pressure at start of consolidation		319	334	369	kPa
	Pore pressure at end of consolidation		300	300	300	kPa
	Pore pressure dissipation at end of consolidation		100	100	100	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	0.68	0.76	0.57	m^2/year
	Coefficient of Compressibility	M_{vi}	0.39	0.27	0.20	m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	8.2E-11	6.3E-11	3.4E-11	m/s



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SLR8.1
Rev 86.0
Feb18

SOCOTEC

1157

Printed:20/07/2018 10:44

Figure

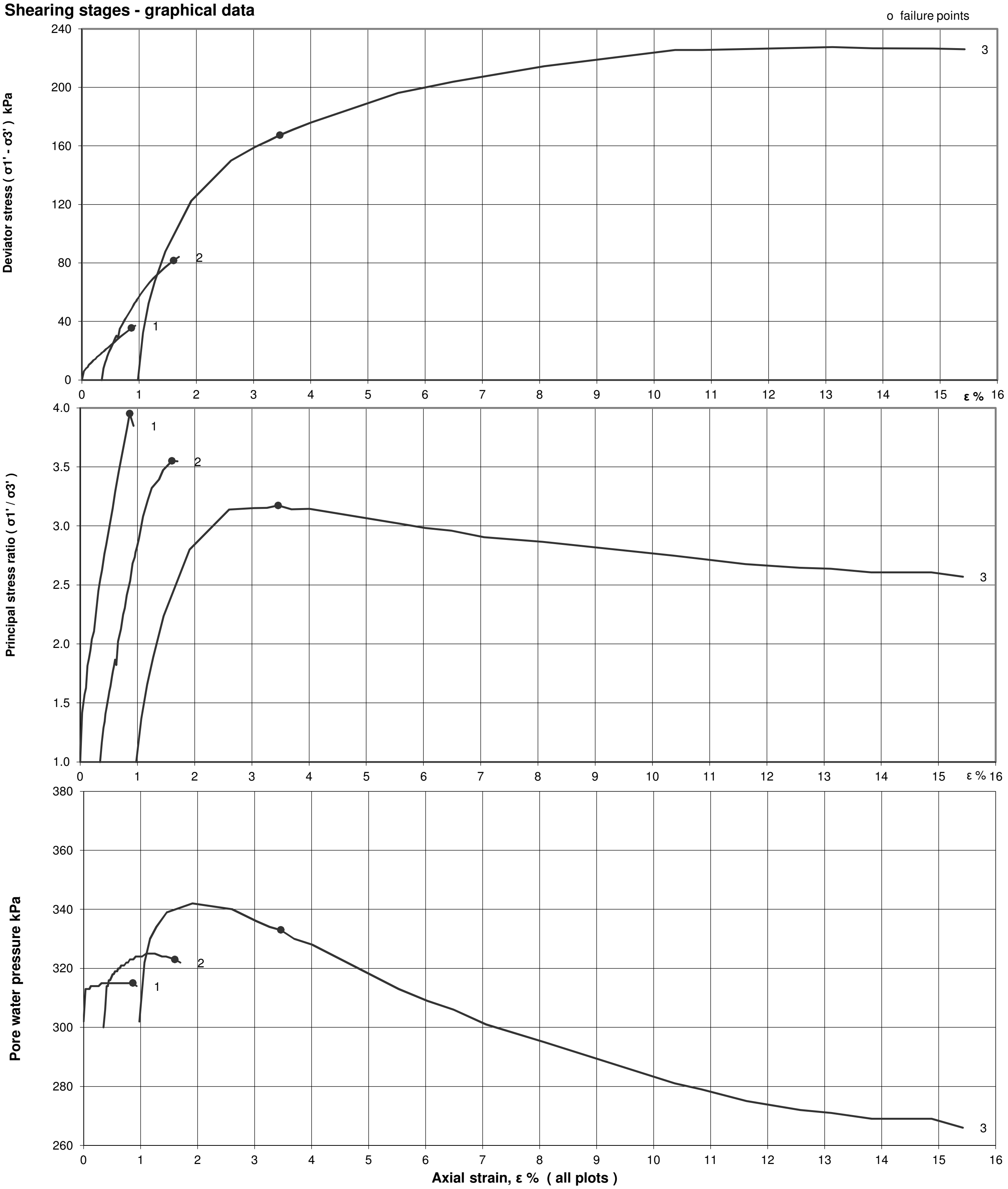
CUM

sheet 1 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH5		
Project Name	IMMINGHAM		Depth (m BGL)	11 - 11.45		
			No	35	Type	UT
			ID			
			Spec Ref			

Shearing stages - graphical data

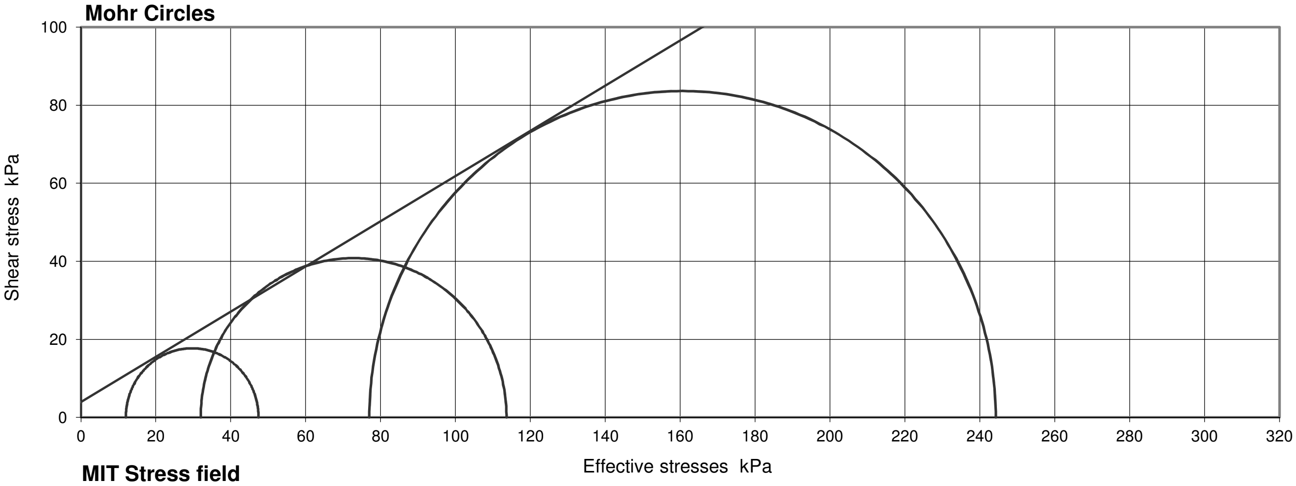


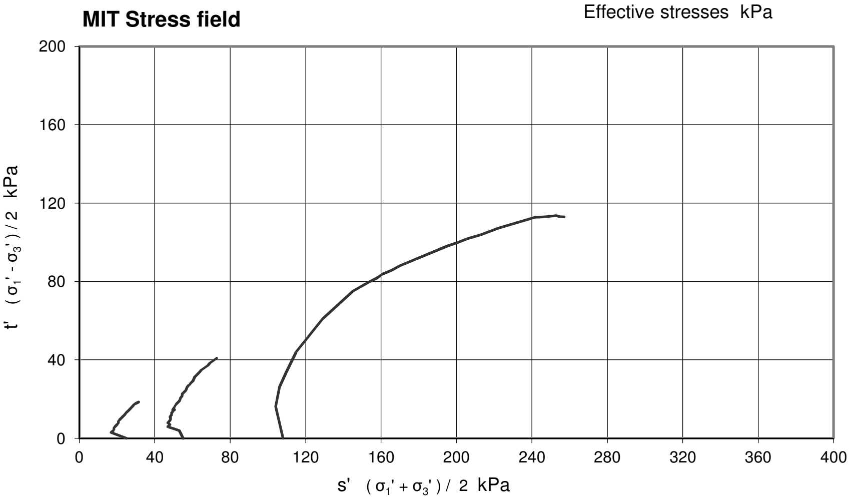
Axial strain, ε % (all plots)

Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:44	**Figure** **CUM** sheet 2 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH5		
Project Name	IMMINGHAM		Depth (m BGL)	11 - 11.45		
			No	35	Type	UT
			ID			
			Spec Ref			


Mohr Circles

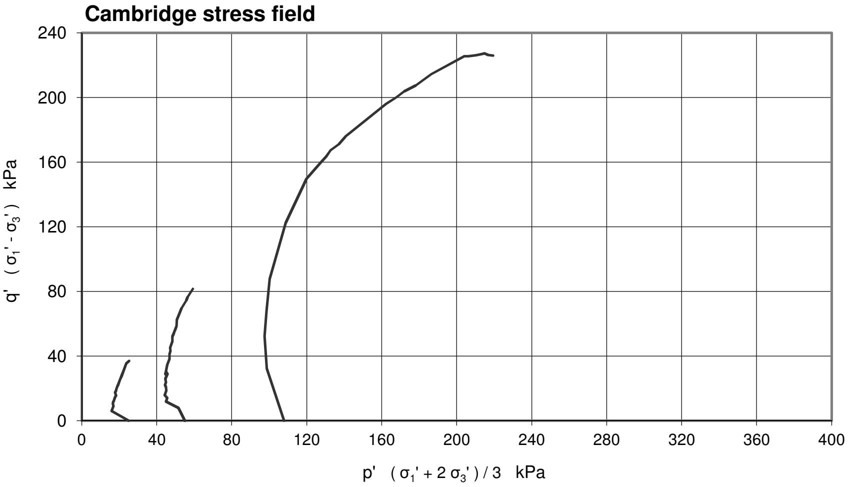

MIT Stress field

Compression stages

Stage	1	2	3	
Cell pressure	327	355	410	kPa
Initial pwp	302	300	302	kPa
Initial σ_3'	25	55	108	kPa
Rate of strain	0.50	0.50	0.50	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
Axial strain	0.87	1.60	3.46	%
(σ_1' / σ_3') $_f$	3.952	3.551	3.172	
(σ_1' - σ_3') $_f$	35.4	81.6	167.3	kPa
u_f	315	323	333	kPa
σ_3' $_f$	12	32	77	kPa
σ_1' $_f$	47	114	244	kPa
A_f	0.37	0.28	0.19	
Time to failure	1.7	3.2	6.9	hrs


Cambridge stress field

Shear Strength Parameters

at peak stress ratio

		Linear regression
c '	kPa	4.0
Ø '	degrees	30.1
		Manual re-assessment
c '	kPa	-
Ø '	degrees	-

Mode of failure

Notes : Deviator stresses corrected for area change, vertical side drains and 0.595 mm thick rubber membrane(s)

Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:44	**Figure** **CUM** sheet 3 of 3

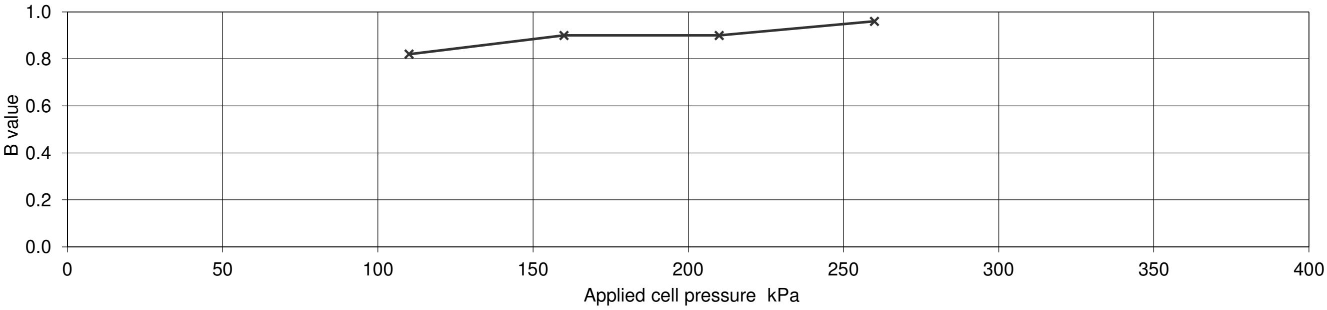
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH6		
Project Name	IMMINGHAM		Depth (m BGL)	9 - 9.45		
			No	19	Type	UT
			ID			
			Spec Ref			

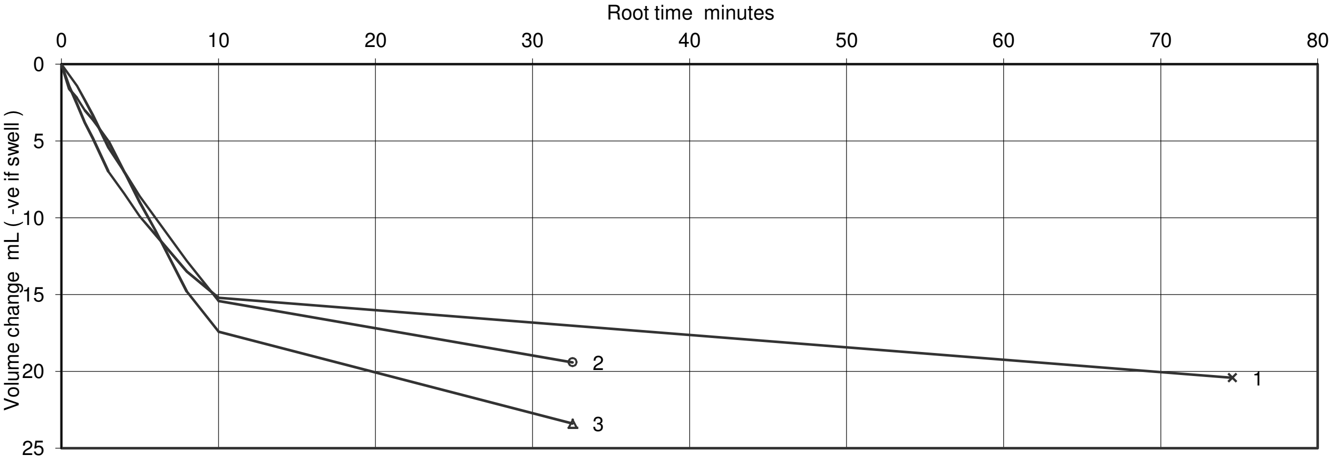
Specimen Details		
Initial		
Length	mm	203.49
Diameter	mm	102.79
Bulk Density	Mg/m³	2.14
Water Content	%	17
Dry density	Mg/m³	1.84
After test		
Bulk Density	Mg/m³	2.17
Water Content	%	15
Dry density	Mg/m³	1.88

Soil Description	Soft to firm brown slightly sandy slightly gravelly CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	260
Final pore water pressure	kPa	238
Final B Value		0.96



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		355	410	520	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		55	110	220	kPa
	Pore pressure at start of consolidation		333	371	459	kPa
	Pore pressure at end of consolidation		300	303	300	kPa
	Pore pressure dissipation at end of consolidation		100	96	100	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C_{vi}	2.41	1.42	1.38	m^2/year
	Coefficient of Compressibility	M_{vi}	0.36	0.17	0.09	m^2/MN
	Coefficient of Permeability (calculated)	k_{vi}	2.7E-10	7.4E-11	3.8E-11	m/s



Ref		Figure
SLR8.1 Rev 86.0 Feb18	Printed:20/07/2018 10:45	**CUM** sheet 1 of 3

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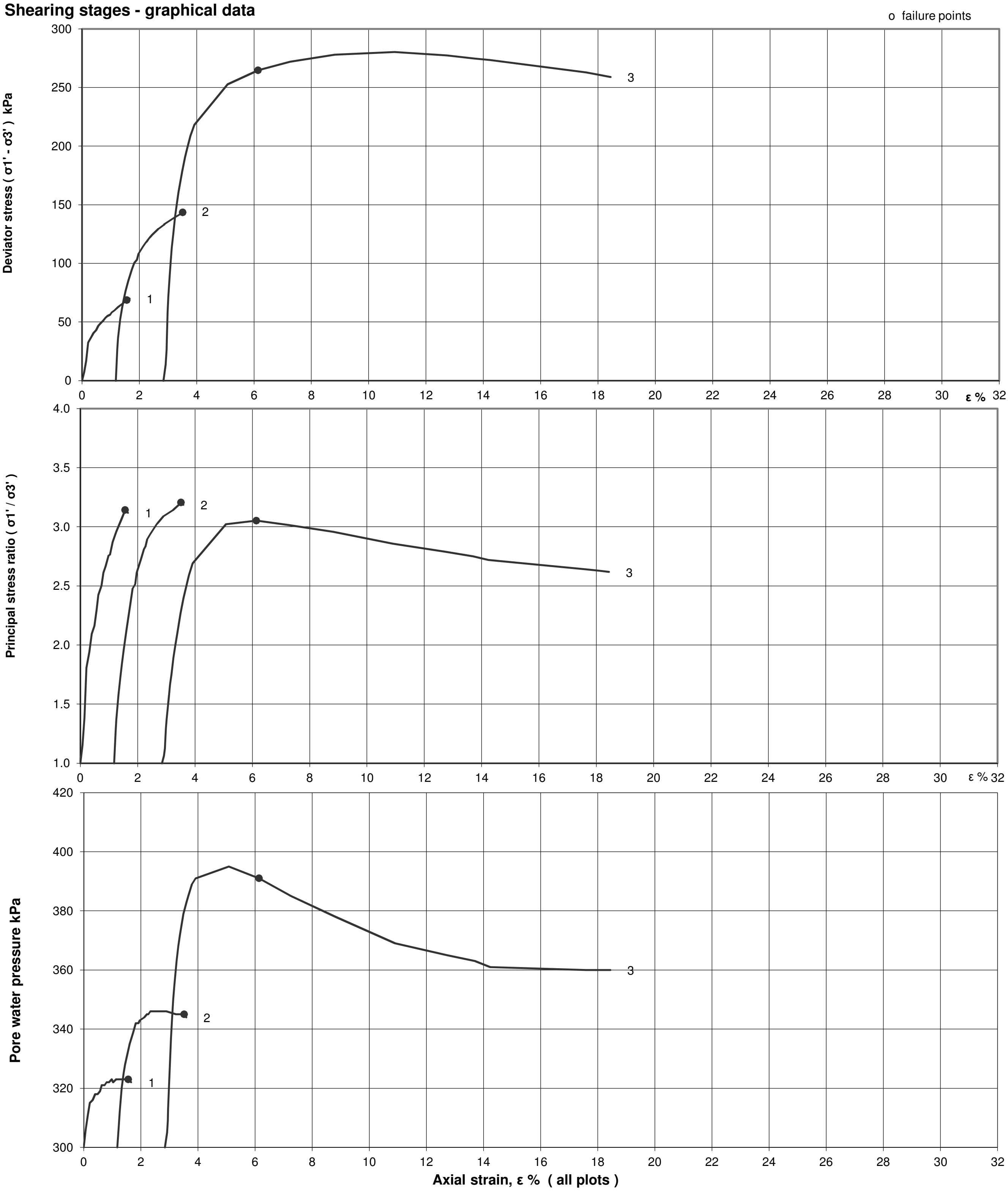
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH6
Project Name	IMMINGHAM		Depth (m BGL)	9 - 9.45
			No	19
			Type	UT
			ID	
			Spec Ref	

Shearing stages - graphical data



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SLR8.1
Rev 86.0
Feb18

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1157

Printed:20/07/2018 10:45

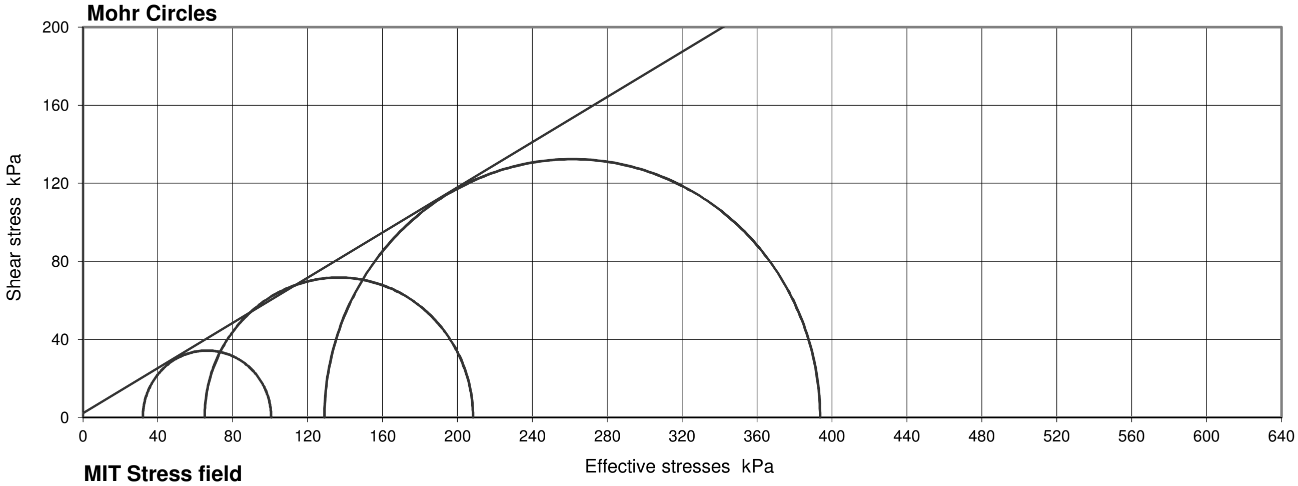
Figure

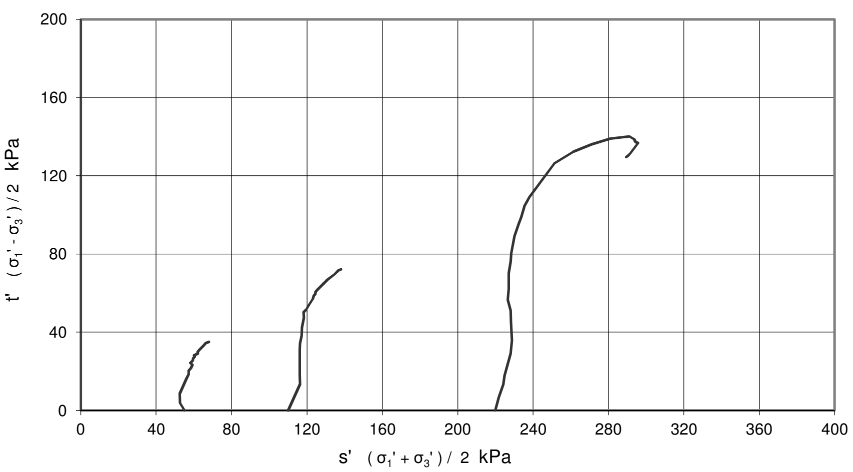
CUM

sheet 2 of 3

Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	A8015-18	Sample Details:	Hole No	BH6		
Project Name	IMMINGHAM		Depth (m BGL)	9 - 9.45		
			No	19	Type	UT
			ID			
			Spec Ref			


Mohr Circles

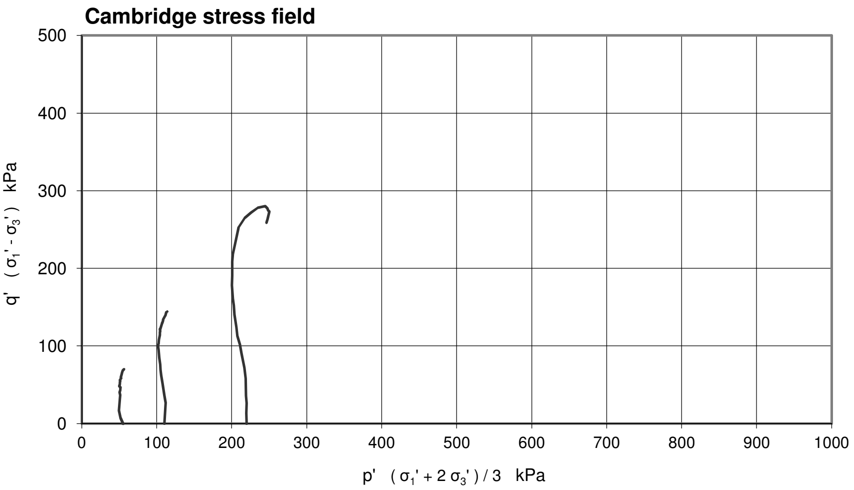

MIT Stress field

Compression stages

Stage	1	2	3	
Cell pressure	355	410	520	kPa
Initial pwp	300	300	300	kPa
Initial σ_3'	55	110	220	kPa
Rate of strain	1.80	1.80	1.80	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
Axial strain	1.57	3.52	6.15	%
$(\sigma_1' / \sigma_3')_f$	3.142	3.205	3.052	
$(\sigma_1' - \sigma_3')_f$	68.5	143.3	264.7	kPa
u_f	323	345	391	kPa
$\sigma_3'_f$	32	65	129	kPa
$\sigma_1'_f$	101	208	394	kPa
A_f	0.34	0.31	0.34	
Time to failure	0.9	2.0	3.4	hrs


Cambridge stress field

Shear Strength Parameters
at peak stress ratio

		Linear regression
c '	kPa	2.2
Ø '	degrees	30.1
		Manual re-assessment
c '	kPa	-
Ø '	degrees	-

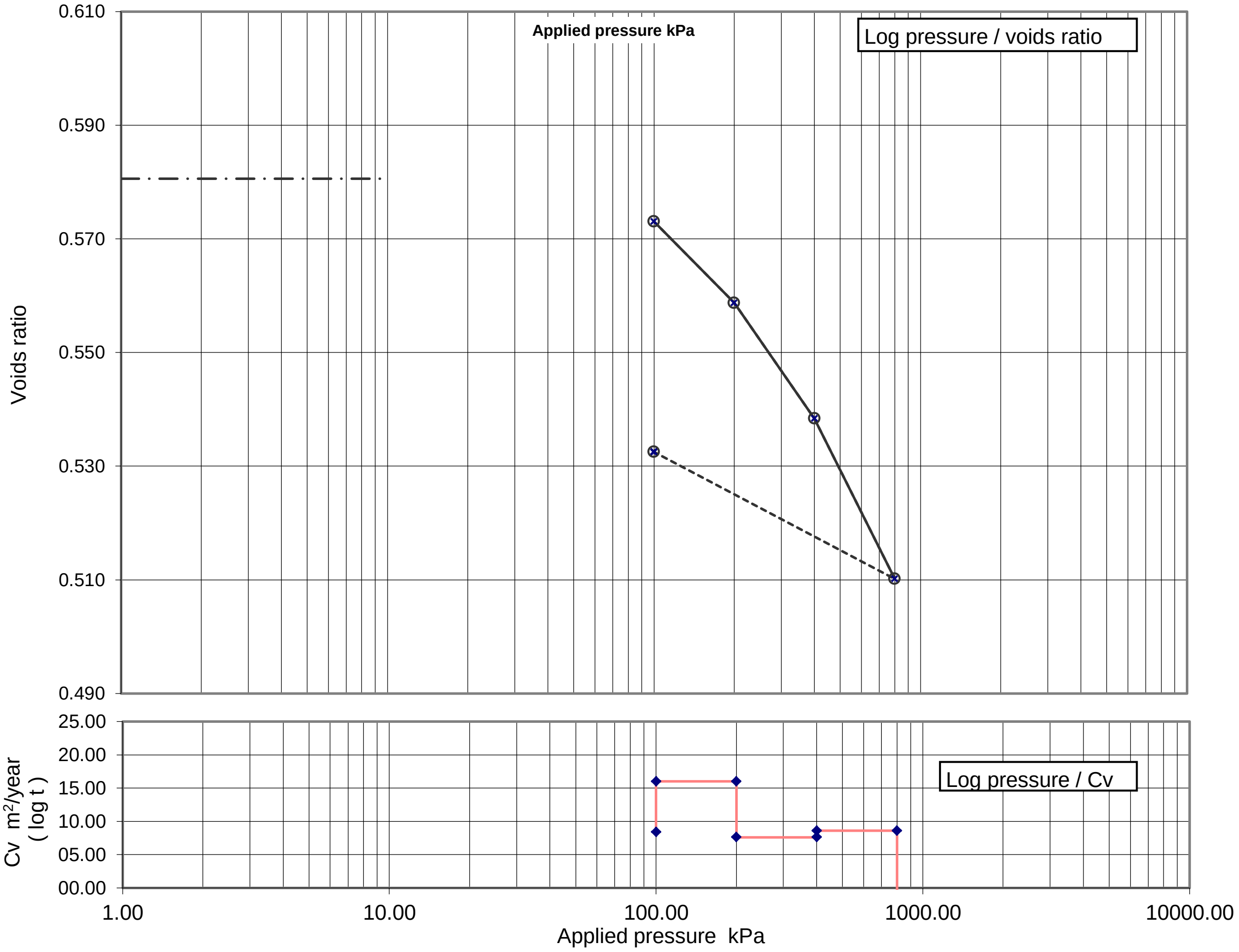
Mode of failure

Notes : Deviator stresses corrected for area change, vertical side drains and 0.595 mm thick rubber membrane(s)

Ref SLR8.1 Rev 86.0 Feb18	SOCOTEC UKAS TESTING 1157	Printed:20/07/2018 10:45	**Figure** **CUM** sheet 3 of 3

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID: A8015-1820180409104630	Hole No	BH1
		Sample Depth (m BGL)	3.00 - 3.45
		Sample Type and No	UT10
		Specimen Ref	



Soil description	Firm laminated brown slightly sandy slightly gravelly CLAY.			
Preparation	Undisturbed			
Index properties	Liquid limit %		Plastic limit %	
(if available)				

Specimen details	Initial	Final	
Particle density	2.70	assumed	Mg/m3
Diameter	75.08		mm
Height	19.11	18.52	mm
Voids ratio	0.581	0.533	
Moisture content	21	21	%
Bulk density	2.06	2.13	Mg/m3
Dry density	1.71	1.76	Mg/m3
Saturation	97	105	%
Average temperature for test	20		oC

Swelling pressure >50 kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
50	0.5806				
100	0.5730	0.095	8.4	9	
200	0.5587	0.091	16	17	
400	0.5384	0.065	7.6	8.1	
800	0.5102	0.046	8.6	9.2	
100	0.5325	0.021	-	-	

Specimen taken 10 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

UKAS TESTING
1157

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Project No	A8015-18	**Figure**
Project Name	VPI IMMINGHAM	**OED**

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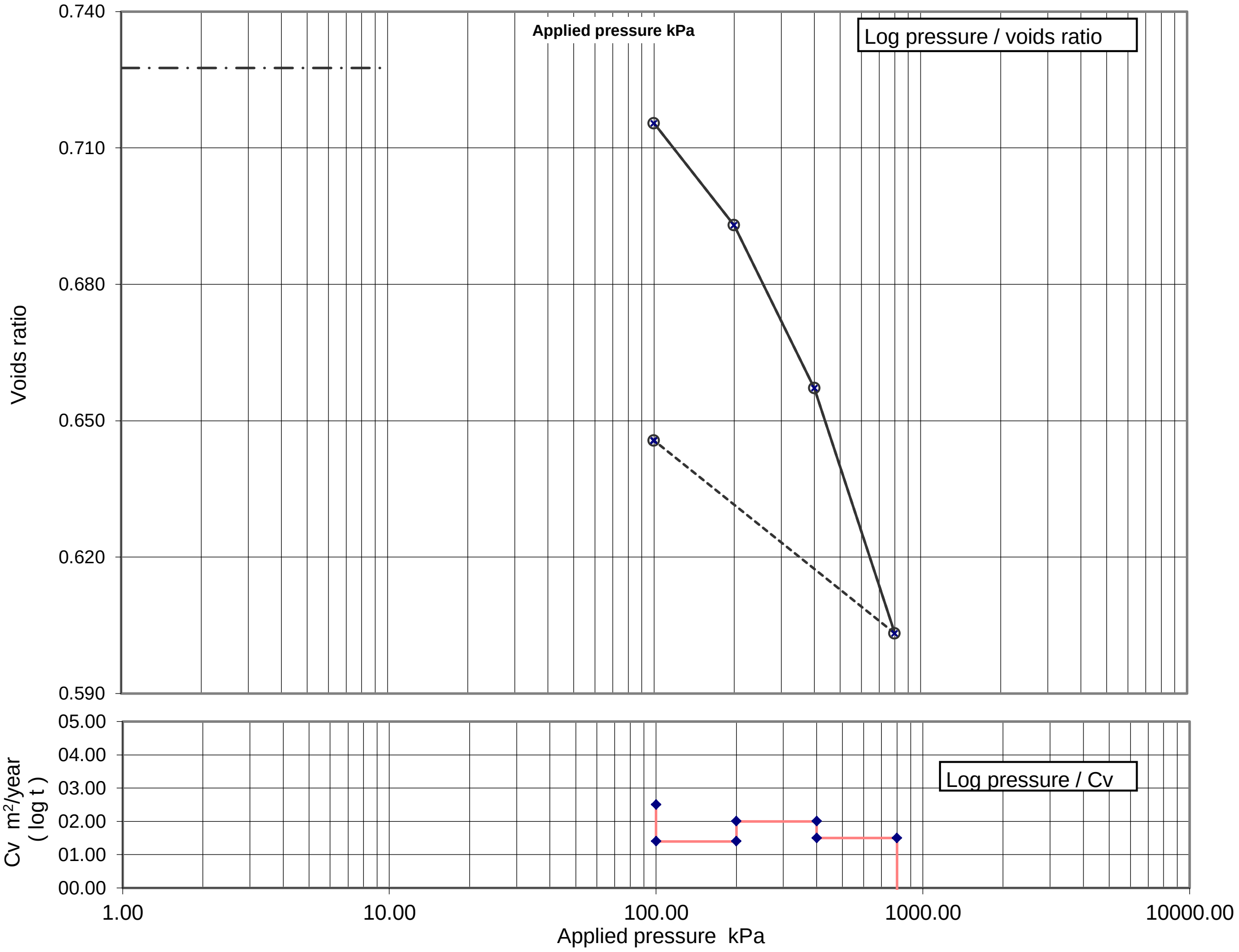
02/07/2018 15:26

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID: A8015-1820180413011601	Hole No	BH2
		Sample Depth (m BGL)	3.30 - 3.75
		Sample Type and No	UT15
		Specimen Ref	



Soil description	Firm laminated brown slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	47	Plastic limit %	22

Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m3
Diameter	75.08		mm
Height	18.94	18.04	mm
Voids ratio	0.728	0.646	
Moisture content	26	25	%
Bulk density	2.01	2.08	Mg/m3
Dry density	1.59	1.67	Mg/m3
Saturation	100	105	%
Average temperature for test	20		oC

Swelling pressure >50 kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
50	0.7276				
100	0.7154	0.142	2.5	2.6	
200	0.6930	0.131	1.4	1.5	
400	0.6571	0.106	2	2	
800	0.6032	0.081	1.5	1.6	
100	0.6456	0.038	-	-	

Specimen taken 10 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

UKAS TESTING
1157

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Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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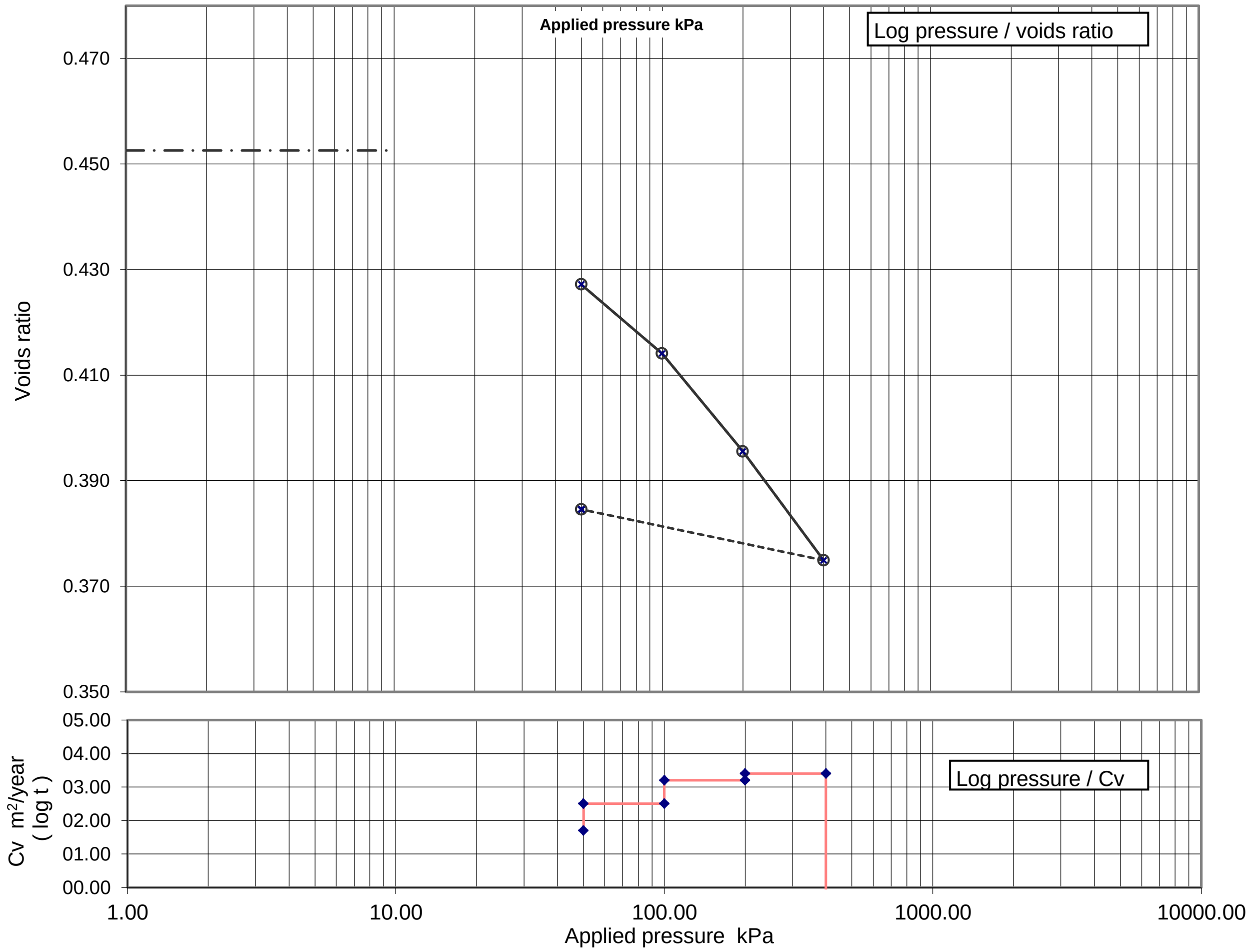
ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413012711	Sample Depth (m BGL)	8.00 - 8.45
		Sample Type and No	UT36
		Specimen Ref	



Soil description	Firm brown slightly sandy slightly gravelly CLAY. Gravel is chalk.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %		Plastic limit %	

Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m3
Diameter	75.08		mm
Height	19.10	18.20	mm
Voids ratio	0.453	0.385	
Moisture content	16	14	%
Bulk density	2.19	2.27	Mg/m3
Dry density	1.89	1.99	Mg/m3
Saturation	97	101	%
Average temperature for test	20		oC

Swelling pressure: not measured kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
0	0.4526				
50	0.4272	0.350	1.7	1.8	
100	0.4141	0.183	2.5	2.7	
200	0.3955	0.131	3.2	3.3	
400	0.3749	0.074	3.4	3.5	
50	0.3846	0.020	-	-	

Specimen taken 20 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

1157

Project No	A8015-18	**Figure**
Project Name	VPI IMMINGHAM	**OED**

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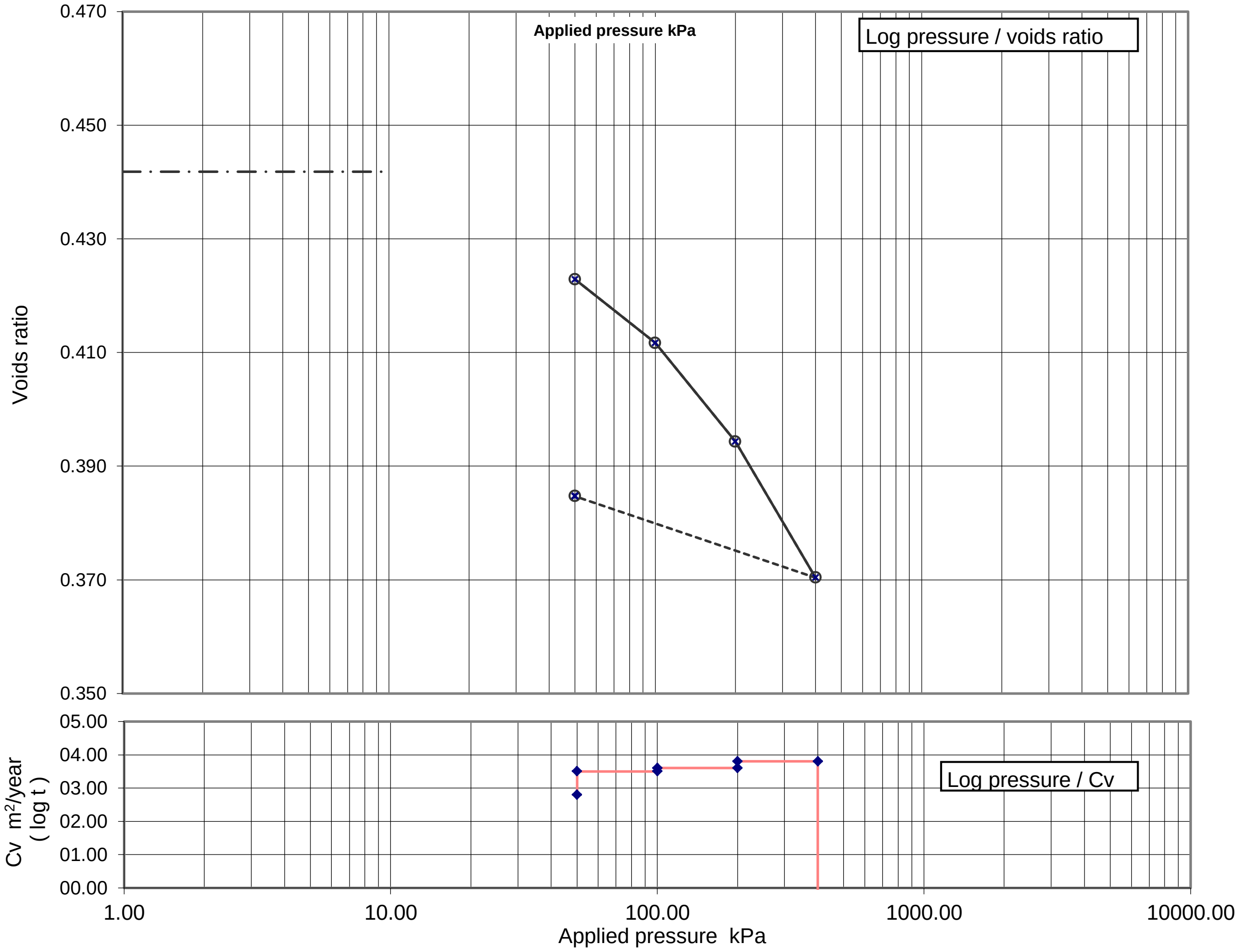
ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID: A8015-1820180413102646	Hole No	BH3
		Sample Depth (m BGL)	5.00 - 5.45
		Sample Type and No	UT10
		Specimen Ref	



Soil description	Firm brown slightly sandy slightly gravelly CLAY.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % | | Plastic limit % |

Specimen details	Initial	Final	
Particle density	2.70	assumed	Mg/m3
Diameter	75.03		mm
Height	18.93	18.18	mm
Voids ratio	0.442	0.385	
Moisture content	16	15	%
Bulk density	2.18	2.24	Mg/m3
Dry density	1.87	1.95	Mg/m3
Saturation	100	105	%
Average temperature for test	20		oC
Swelling pressure	not measured		kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
0	0.4418				
50	0.4229	0.263	2.8	3	
100	0.4117	0.157	3.5	3.7	
200	0.3943	0.123	3.6	3.8	
400	0.3704	0.086	3.8	4.1	
50	0.3847	0.030	-	-	

Specimen taken 10 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

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1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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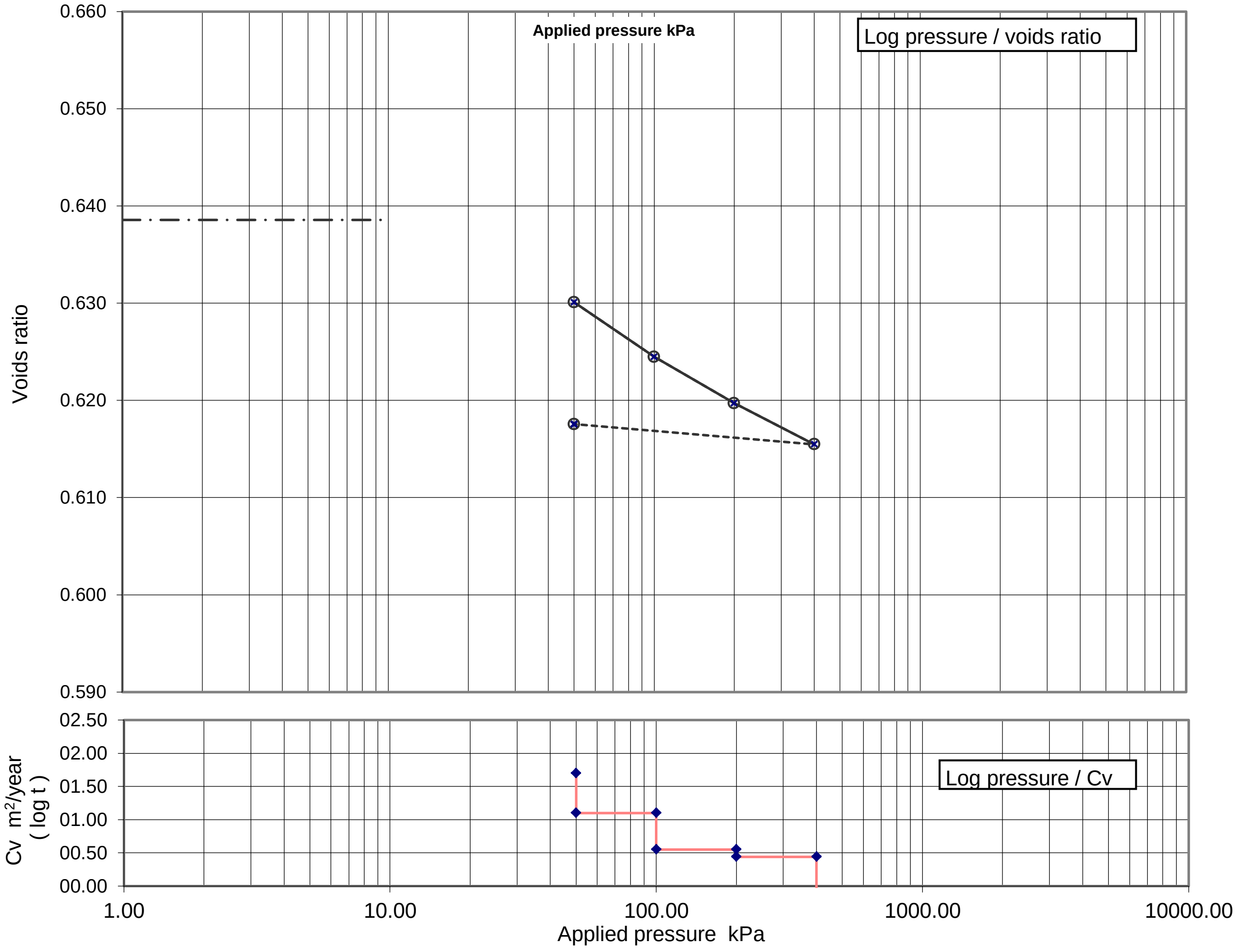
02/07/2018 15:26

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID: A8015-1820180418115035	Hole No	BH4
		Sample Depth (m BGL)	3.10 - 3.55
		Sample Type and No	UT7
		Specimen Ref	



Soil description	Brown slightly sandy SILT.		
Preparation	Undisturbed		
Index properties (if available)	Liquid limit %		Plastic limit %

Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m3
Diameter	75.01		mm
Height	18.94	18.69	mm
Voids ratio	0.639	0.618	
Moisture content	23	21	%
Bulk density	2.06	2.06	Mg/m3
Dry density	1.68	1.70	Mg/m3
Saturation	98	94	%
Average temperature for test	20		oC

Swelling pressure: not measured kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
0	0.6386				
50	0.6301	0.104	1.7	1.6	
100	0.6245	0.069	1.1	0.91	
200	0.6197	0.029	0.55	0.61	
400	0.6155	0.013	0.44	0.46	
50	0.6175	0.004	-	-	

Specimen taken 20 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

UKAS TESTING
1157

SOCOTEC

Project No A8015-18
Project Name VPI IMMINGHAM

Figure
OED

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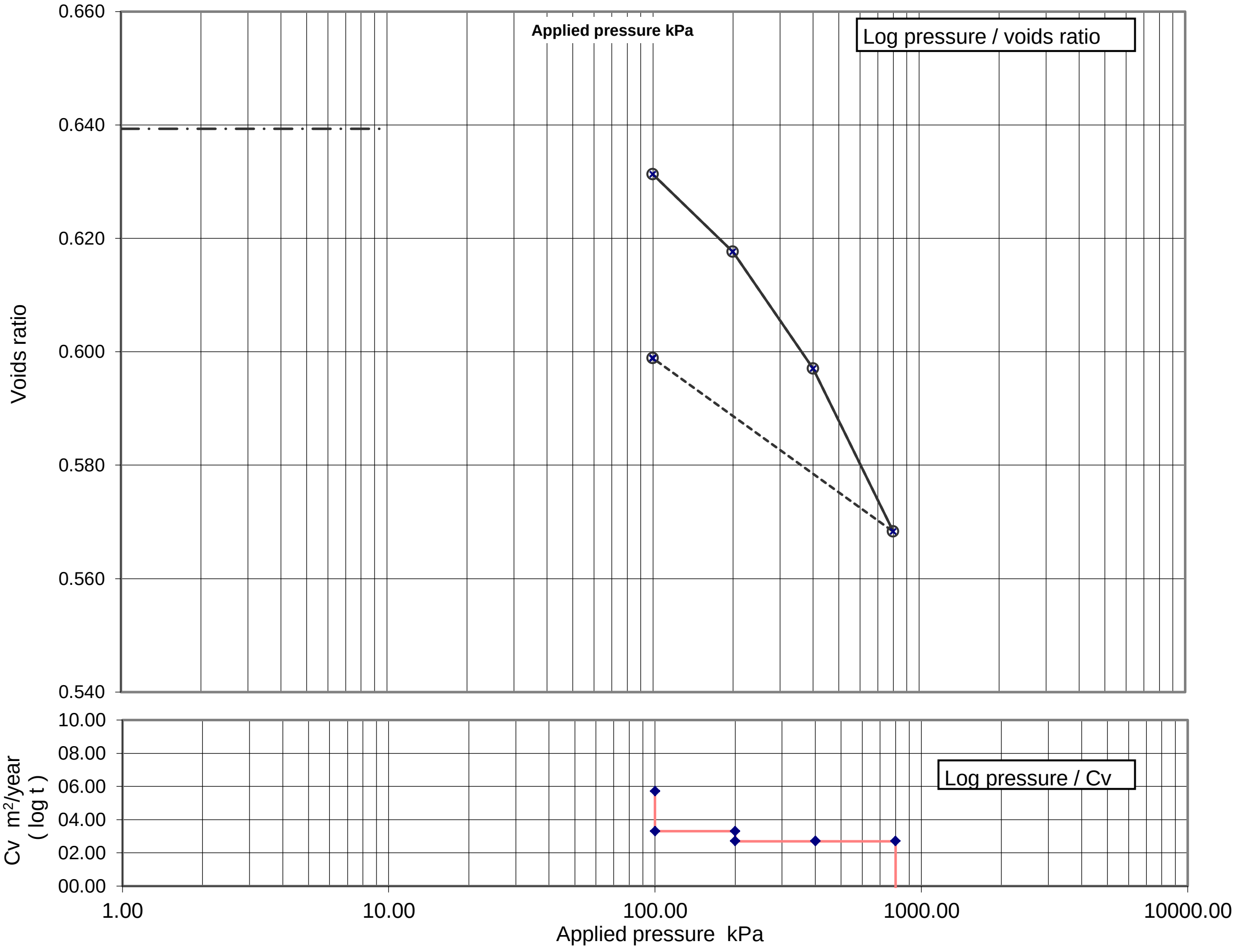
02/07/2018 15:26

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID:
	A8015-1820180418120528

Hole No	BH5
Sample Depth (m BGL)	3.40 - 3.85
Sample Type and No	UT15
Specimen Ref	



Soil description	Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is chalk.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %		Plastic limit %	

Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m3
Diameter	75.17		mm
Height	18.97	18.50	mm
Voids ratio	0.639	0.599	
Moisture content	23	22	%
Bulk density	2.06	2.10	Mg/m3
Dry density	1.68	1.72	Mg/m3
Saturation	99	102	%
Average temperature for test	20		oC

Swelling pressure >50 kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
50	0.6393				
100	0.6313	0.098	5.7	6.1	
200	0.6176	0.084	3.3	1.8	
400	0.5970	0.064	2.7	2.9	
800	0.5683	0.045	2.7	2.9	
100	0.5989	0.028	-	-	

Specimen taken 10 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

UKAS TESTING
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SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

OED

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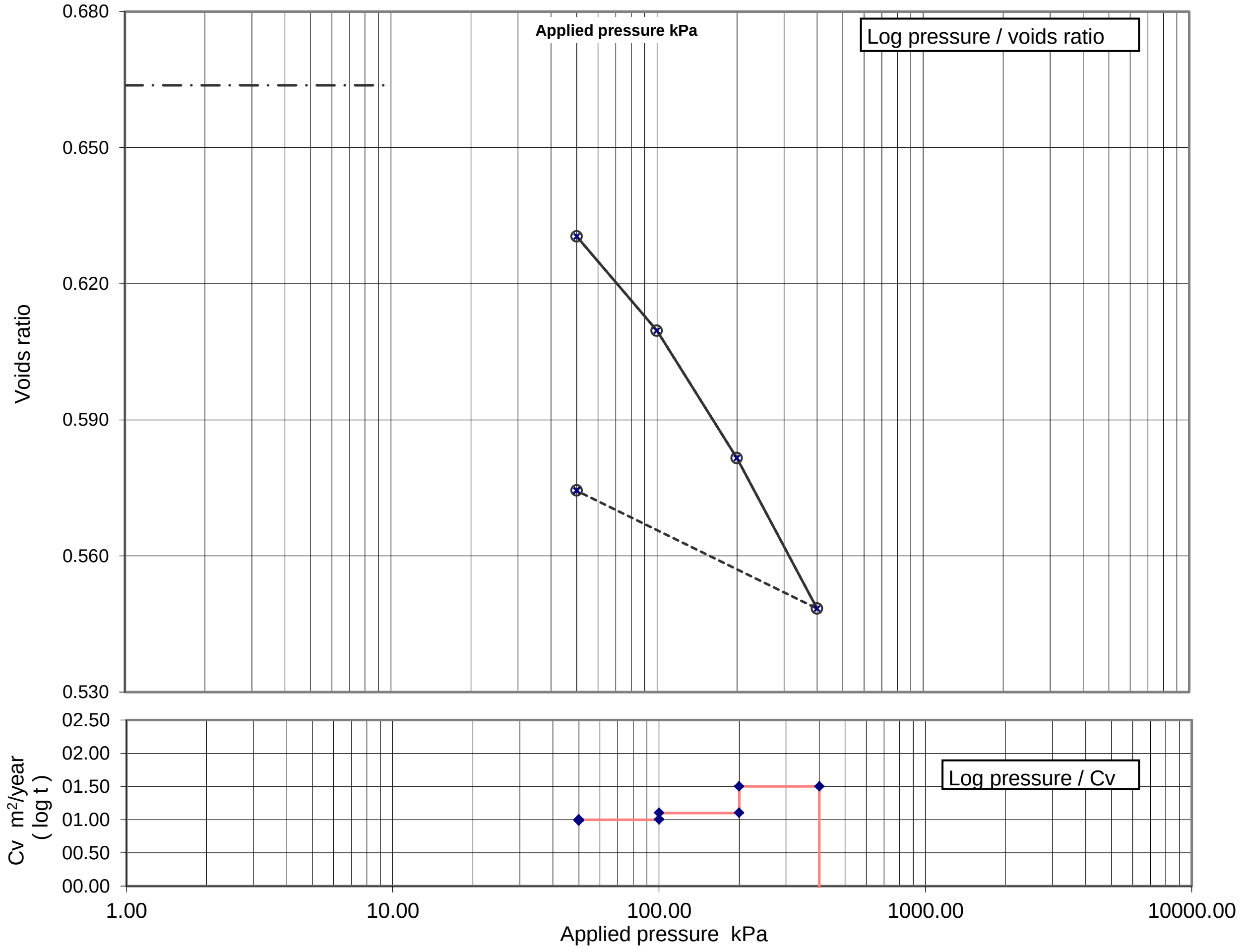
ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID: A8015-1820180409092542	Hole No	BH6
		Sample Depth (m BGL)	4.00 - 4.45
		Sample Type and No	UT10
		Specimen Ref	



Soil description	Soft brown slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %		Plastic limit %	

Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m3
Diameter	75.19		mm
Height	19.12	18.09	mm
Voids ratio	0.664	0.574	
Moisture content	24	21	%
Bulk density	2.05	2.12	Mg/m3
Dry density	1.65	1.75	Mg/m3
Saturation	99	103	%
Average temperature for test	20		oC

Swelling pressure: not measured kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
0	0.6638				
50	0.6304	0.401	0.98	1.1	
100	0.6096	0.255	1	1	
200	0.5815	0.175	1.1	1.1	
400	0.5484	0.105	1.5	1.5	
50	0.5744	0.048	-	-	

Specimen taken 40 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

1157

Project No	A8015-18	**Figure**
Project Name	VPI IMMINGHAM	**OED**

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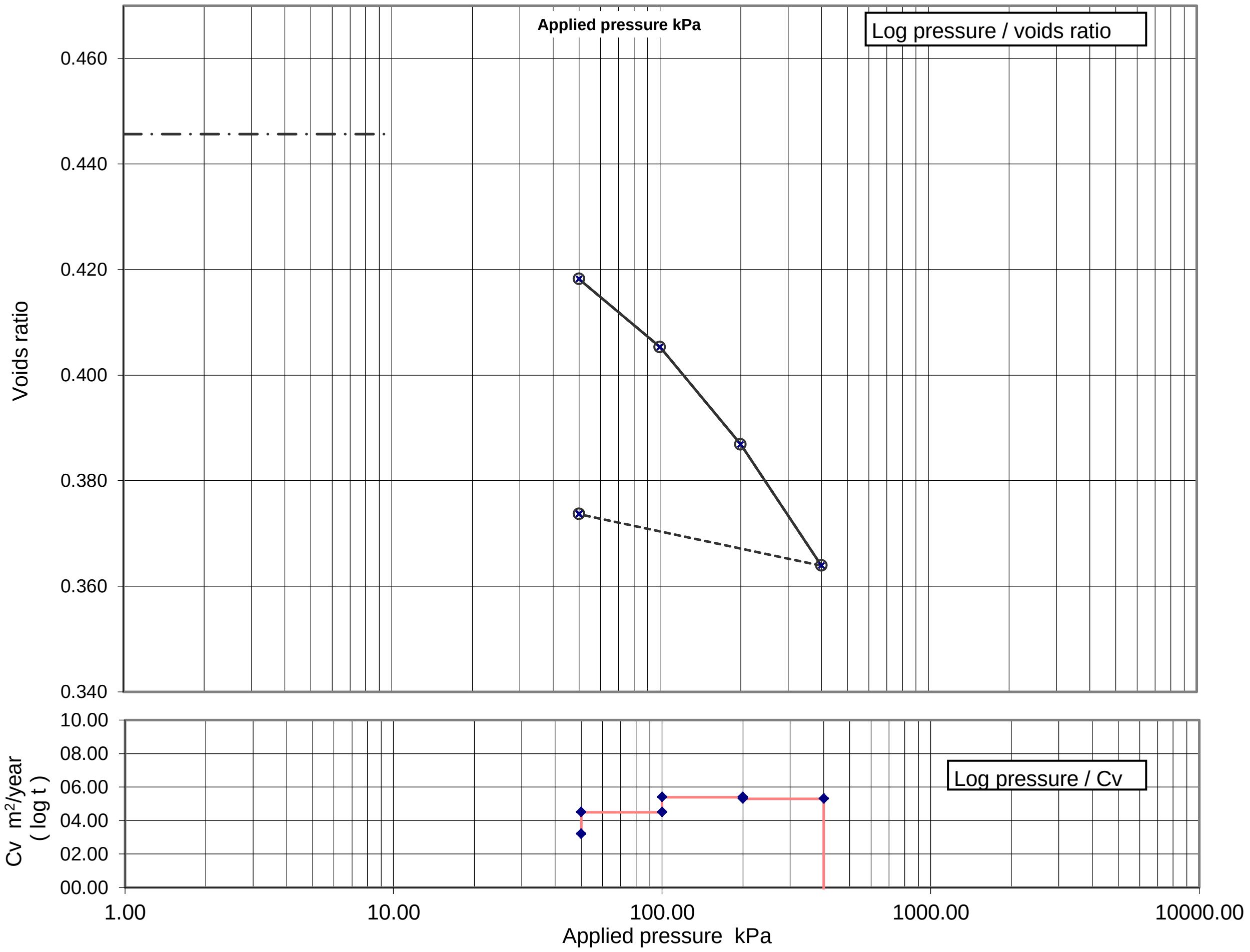
ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID: A8015-1820180409092658	Hole No	BH6
		Sample Depth (m BGL)	9.00 - 9.45
		Sample Type and No	UT19
		Specimen Ref	



Soil description	Firm brown slightly sandy slightly gravelly CLAY. Gravel is chalk.
Preparation	Undisturbed

Index properties	Liquid limit %		Plastic limit %	
(if available)				

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m3
Diameter	75.04		mm
Height	18.96	18.02	mm
Voids ratio	0.446	0.374	
Moisture content	17	15	%
Bulk density	2.14	2.21	Mg/m3
Dry density	1.83	1.93	Mg/m3
Saturation	98	105	%
Average temperature for test	20		oC

Swelling pressure: not measured kPa

Notes :

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
0	0.4456				
50	0.4182	0.380	3.2	3.3	
100	0.4053	0.182	4.5	4.8	
200	0.3868	0.131	5.4	5.7	
400	0.3639	0.083	5.3	5.5	
50	0.3737	0.020	-	-	

Specimen taken 10 mm from base of sample

QA Ref
SLR 5.3
Rev 2.16
Nov 16

UKAS TESTING
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Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID: A8015-1820180413011428	Hole No	BH2
		Sample Depth (m BGL)	1.20 - 1.65
		Sample Type and No	UT7
		Specimen Ref	

Specimen Description: Firm brown slightly sandy slightly gravelly CLAY

Test Method: BS 1377: Part 6: 1990, clause 3.7

Date of test: 26/06/2018

SPECIMEN DETAILS

Type of sample: Undisturbed

Preparation:

	Initial	Final	
Height	19.32		mm
Diameter	71.94		mm
Bulk density	2.08	3.52	Mg/m3
Moisture content	18.0	23.0	%
Dry density	1.76	2.67	Mg/m3
Voids Ratio	0.502		
Degree of Saturation	95		%
Particle density	2.65		Mg/m3 Assumed

SWELLING

Swelling pressure		kPa
Water taken in during swelling stage		ml

SATURATION

Back pressure

Cell pressure increments	50	kPa
Pressure differential	10	kPa
Final diaphragm pressure	460	kPa
Final back pressure	443	kPa
Final pore pressure ratio, δu / δσ	1.00	
Water taken in during saturation stage	28.9	ml
Voids ratio at end of saturation stage	0.500	

CONSOLIDATION STAGES

Type of drainage: Radial outwards

Type of loading: Free strain

PWP location: Centre base

Centre drain (if applicable)

Diameter: mm

Material:

Method of formation:

Stage number	1	2	3	4	5		
Diaphragm pressure	475	500	550	650	500		kPa
Back pressure	450	450	450	450	450		kPa
Initial Pore pressure built up	459	476	486	493	362		kPa
Final pore pressure	450	450	451	450	450		kPa
Effective stress (actual) at end of stage	25	50	99	200	50		kPa
Voids at start	0.500	0.173	0.173	0.121	0.102		
Voids at end	0.222	0.173	0.121	0.102	-0.009		
PWP dissipation	100	100	97	100	100		%
Settlement in stage	0.37	0.24	0.17	0.29	-0.12		mm
Volume change in stage (water out = +ve)	14.5	2.6	2.7	1.0	5.8		ml
Mv	7.4	1.6	0.9	0.17	-0.671		m2/MN
Cro	400	1.5	1.4	0.53	0	0	m2/year
Csec	0	0	0	0			
Cro method	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90			
Average stage temperature	20.6	20.6	21.5	21.0	19.6		oC

Remarks:

QA Ref
SLD 3, 5/9
Rev 2.7

SOCOTEC

Project No: A8015-18

Project Name: VPI IMMINGHAM

Figure

HC

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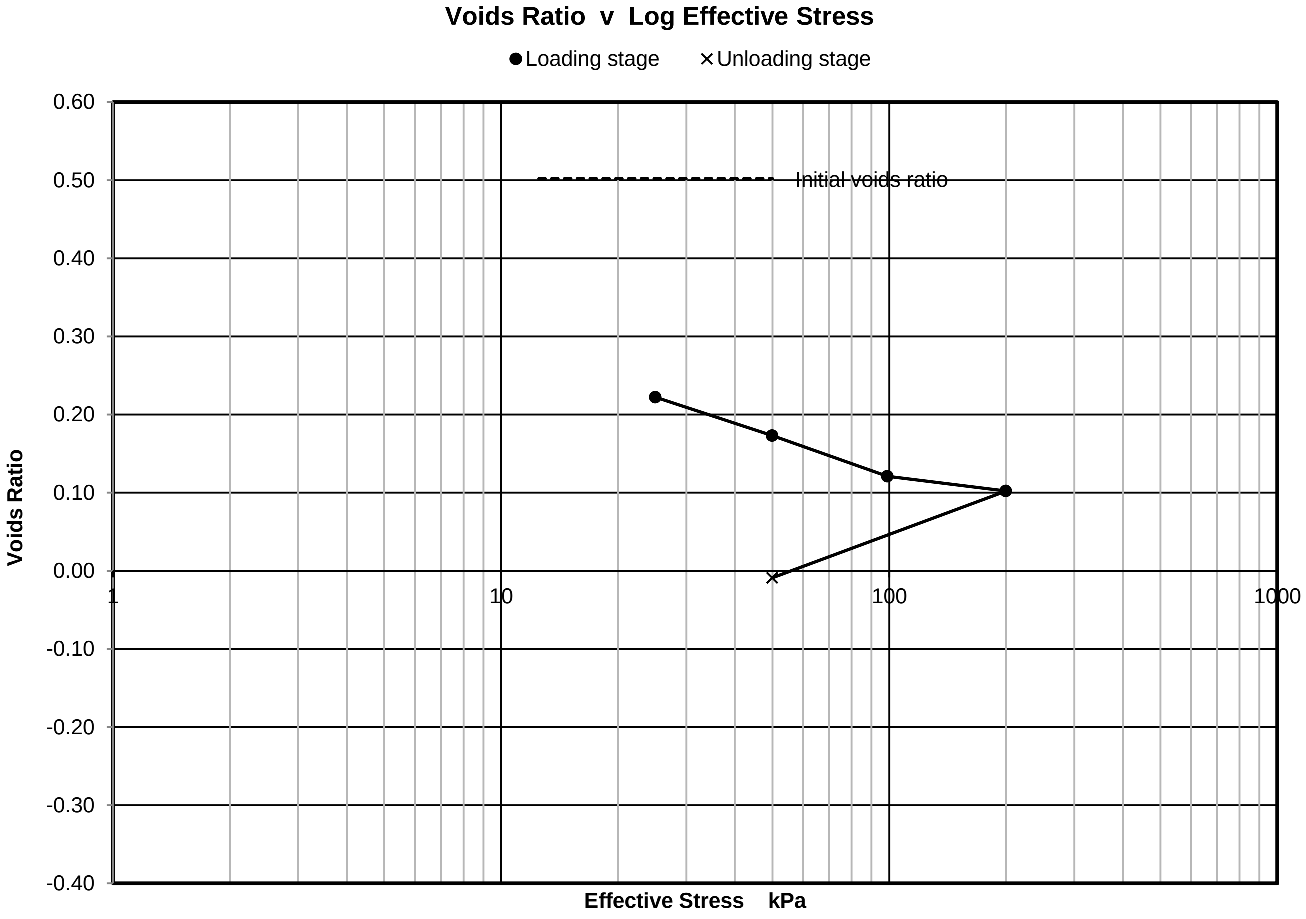
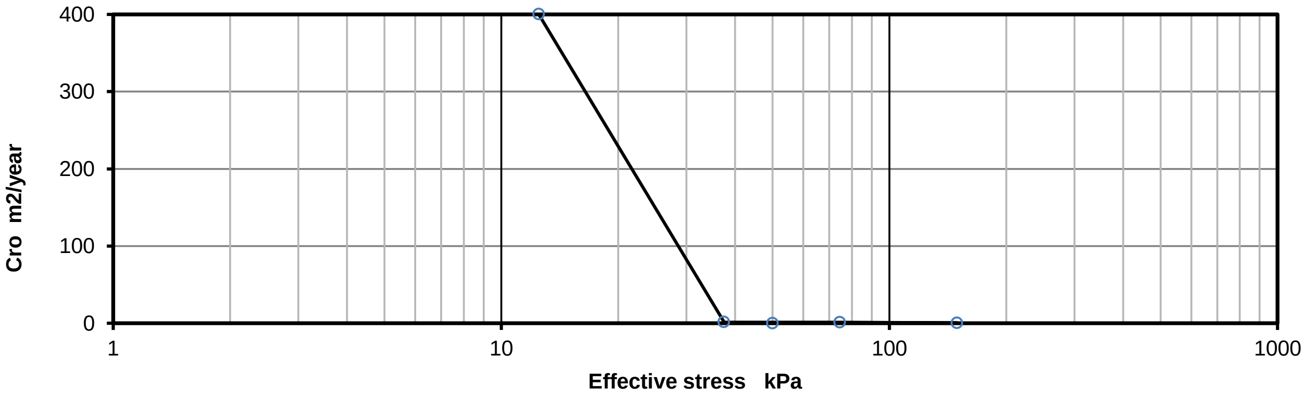
Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413011428	Sample Depth (m BGL)	1.20 - 1.65
		Sample Type and No	UT7
		Specimen Ref	

Graphical data





Voids ratio plotted at effective stress at the end of the stage.
Cro plotted at the average effective stress during the stage.

QA Ref SLD 3, 5/9 Rev 2.7	SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	**Figure** **HC**
			Printed: 31/07/2018 12:23

Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH4
		Sample Depth (m BGL)	2.00 - 2.45
	A8015-1820180418115015	Sample Type and No	UT4
		Specimen Ref	

Specimen Description

Test Method: BS 1377: Part 6: 1990, clause 3.7

Date of test: 26/06/2018

SPECIMEN DETAILS

Type of sample: Undisturbed

Preparation:

	Initial	Final		
Height	18.86		mm	
Diameter	72.13		mm	
Bulk density	2.04	3.32	Mg/m3	
Moisture content	22.0	25.0	%	
Dry density	1.67	2.41	Mg/m3	
Voids Ratio	0.585			
Degree of Saturation	100		%	
Particle density	2.65		Mg/m3	Assumed

SWELLING

Swelling pressure		kPa
Water taken in during swelling stage		ml

SATURATION

Back pressure

Cell pressure increments	50	kPa
Pressure differential	10	kPa
Final diaphragm pressure	310	kPa
Final back pressure	298	kPa
Final pore pressure ratio, δu / δσ	0.99	
Water taken in during saturation stage	27.2	ml
Voids ratio at end of saturation stage	0.560	

CONSOLIDATION STAGES

Type of drainage: Radial outwards

Type of loading: Free strain

PWP location: Centre base

Centre drain (if applicable)

Diameter: mm

Material:

Method of formation:

Stage number	1	2	3	4	5		
Diaphragm pressure	325	350	400	500	350		kPa
Back pressure	300	300	300	300	300		kPa
Initial Pore pressure built up	315	321	335	330	255		kPa
Final pore pressure	300	300	300	300	294		kPa
Effective stress (actual) at end of stage	25	50	100	200	56		kPa
Voids at start	0.560	0.312	0.312	0.235	0.182		
Voids at end	0.388	0.312	0.235	0.182	0.102		
PWP dissipation	100	100	100	100	86		%
Settlement in stage	0.00	0.11	0.26	0.21	-0.09		mm
Volume change in stage (water out = +ve)	8.4	3.7	3.7	2.6	3.9		ml
Mv	4.4	2.2	1.2	0.43	-0.471		m2/MN
Cro	0	36	8.6	7	0	0	m2/year
Csec		0	0	0			
Cro method	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90			
Average stage temperature	21.1	20.8	20.3	21.1	21.8		oC

Remarks

QA Ref
SLD 3, 5/9
Rev 2.7

SOCOTEC

Project No: A8015-18

Project Name: VPI IMMINGHAM

Figure

HC

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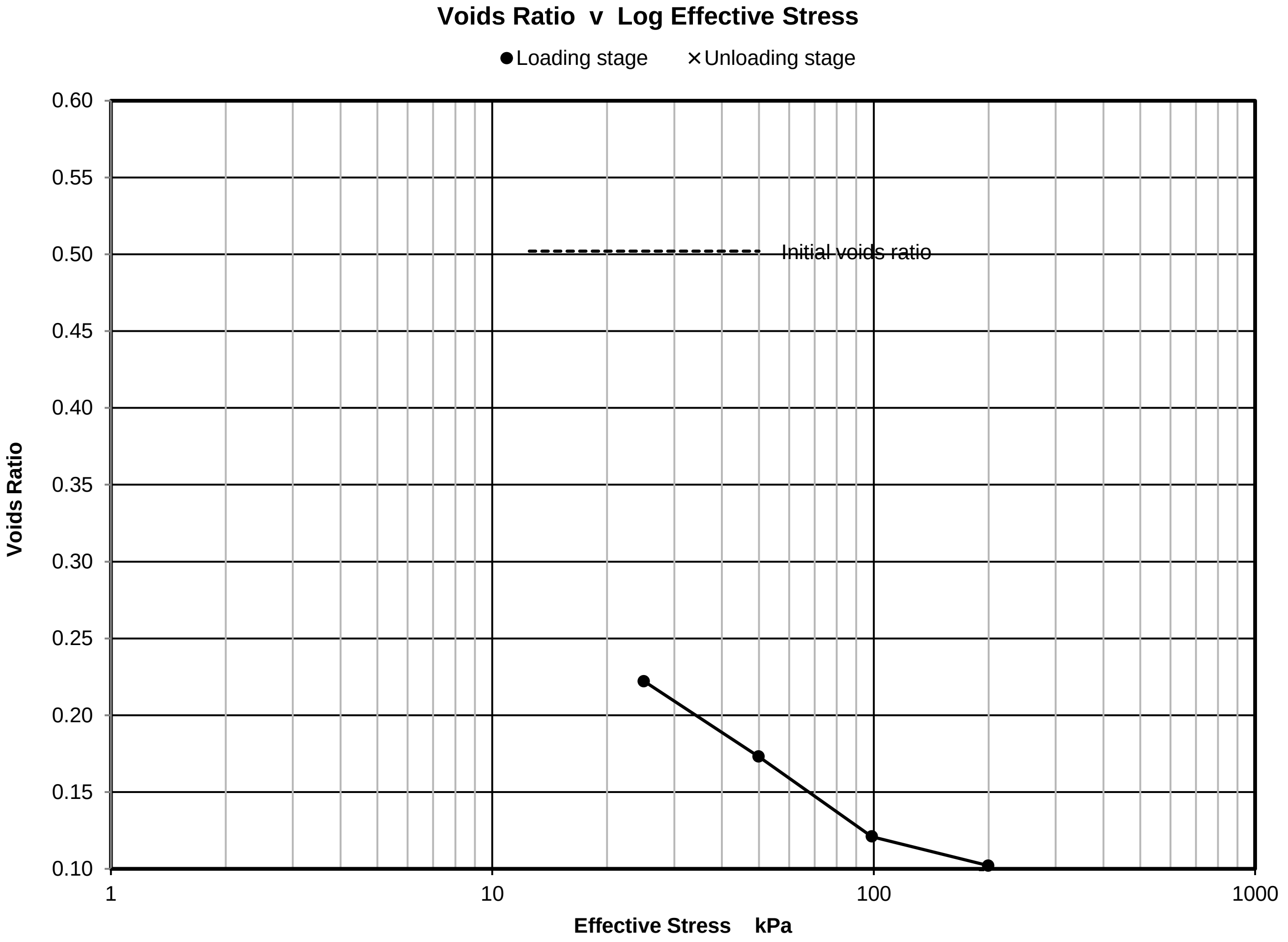
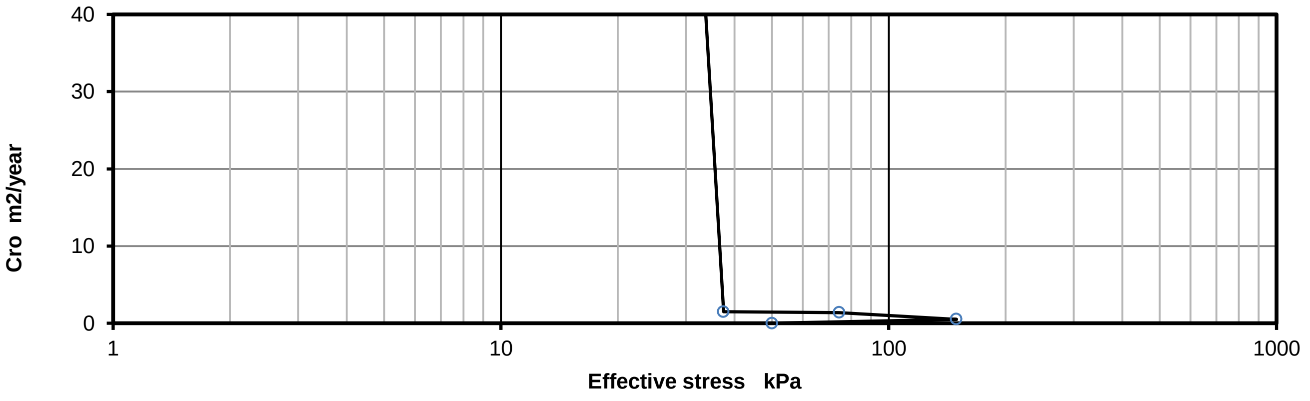
31/07/2018 12:23

Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID: A8015-1820180418115015	Hole No	BH4
		Sample Depth (m BGL)	2.00 - 2.45
		Sample Type and No	UT4
		Specimen Ref	

Graphical data





Voids ratio plotted at effective stress at the end of the stage.
Cro plotted at the average effective stress during the stage.

QA Ref
SLD 3, 5/9
Rev 2.7

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

HC

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31/07/2018 12:23

Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH5
		Sample Depth (m BGL)	1.20 - 1.65
	A8015-1820180418120419	Sample Type and No	UT7
		Specimen Ref	

Specimen Description: Soft to firm brown slightly sandy slightly gravelly CLAY.

Test Method: BS 1377: Part 6: 1990, clause 3.7

Date of test: 11/07/2018

SPECIMEN DETAILS

Type of sample: Undisturbed

Preparation:

	Initial	Final		
Height	18.55		mm	
Diameter	72.06		mm	
Bulk density	2.24	4.58	Mg/m3	
Moisture content	15.0	20.0	%	
Dry density	1.95	4.02	Mg/m3	
Voids Ratio	0.359			
Degree of Saturation	111		%	
Particle density	2.65		Mg/m3	Assumed

SWELLING

Swelling pressure		kPa
Water taken in during swelling stage		ml

SATURATION

Back pressure

Cell pressure increments	50	kPa
Pressure differential	10	kPa
Final diaphragm pressure	360	kPa
Final back pressure	341	kPa
Final pore pressure ratio, δu / δσ	0.96	
Water taken in during saturation stage	22.3	ml
Voids ratio at end of saturation stage	0.290	

CONSOLIDATION STAGES

Type of drainage	Radial outwards	Centre drain (if applicable)		
Type of loading	Free strain	Diameter		mm
PWP location	Centre base	Material		
		Method of formation		

Stage number	1	2	3	4	5		
Diaphragm pressure	375	400	450	550	400		kPa
Back pressure	350	350	350	350	350		kPa
Initial Pore pressure built up	356	369	385	422	246		kPa
Final pore pressure	350	350	350	350	350		kPa
Effective stress (actual) at end of stage	25	50	100	200	50		kPa
Voids at start	0.290	0.145	0.145	0.093	0.041		
Voids at end	0.215	0.145	0.093	0.041	-0.340		
PWP dissipation	100	100	100	100	100		%
Settlement in stage	0.01	0.19	0.22	0.22	-0.62		mm
Volume change in stage (water out = +ve)	4.2	3.9	2.9	2.9	21.2		ml
Mv	2.3	2.3	0.91	0.48	-2.44		m2/MN
Cro	1.3	29	19	2.7	0	0	m2/year
Csec	0	0	0	0			
Cro method	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90			
Average stage temperature	20.3	20.1	20.3	21.3	20.6		oC

Remarks

QA Ref
SLD 3, 5/9
Rev 2.7

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

HC

Test carried out outside the scope of UKAS accreditation.

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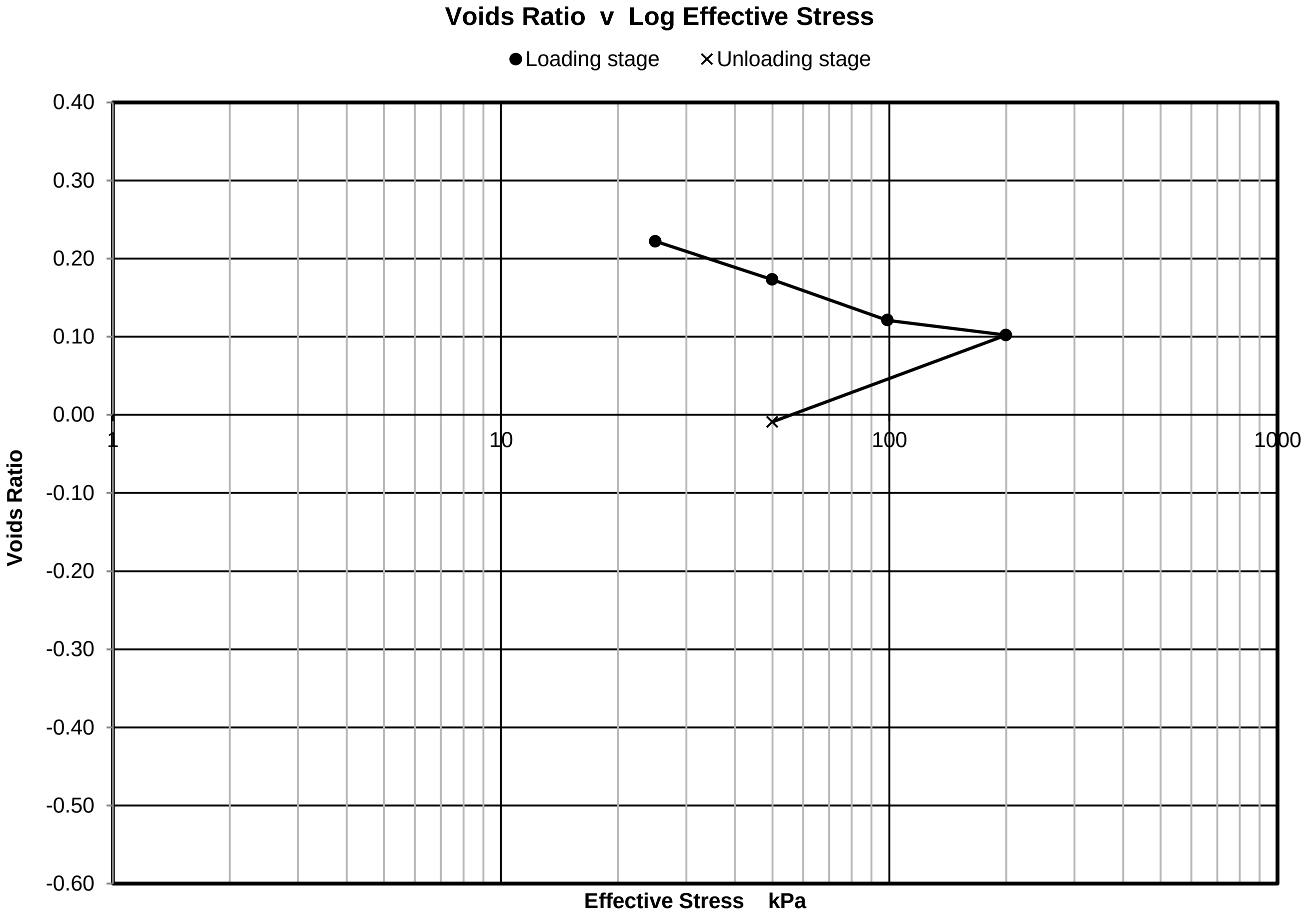
31/07/2018 12:23

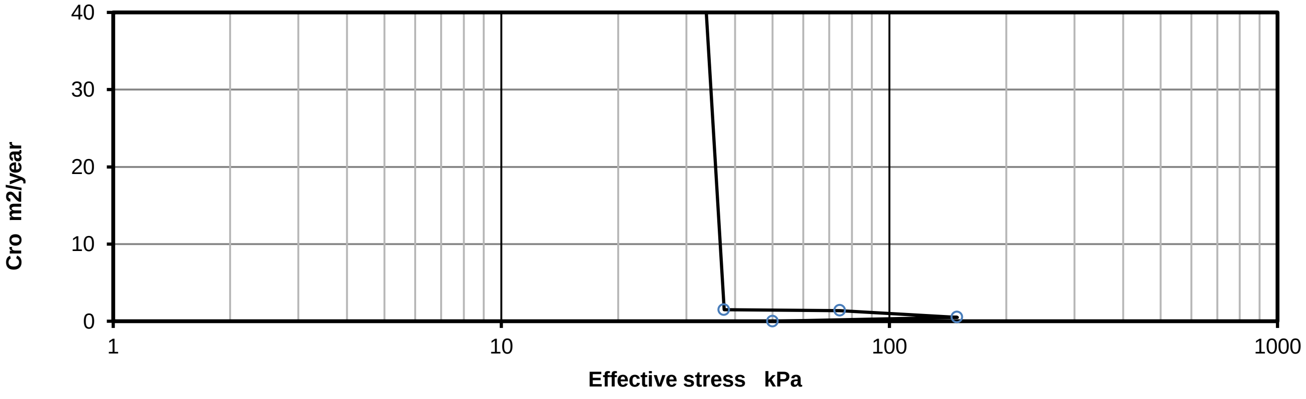
Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID: A8015-1820180418120419

Hole No	BH5
Sample Depth (m BGL)	1.20 - 1.65
Sample Type and No	UT7
Specimen Ref	

Graphical data



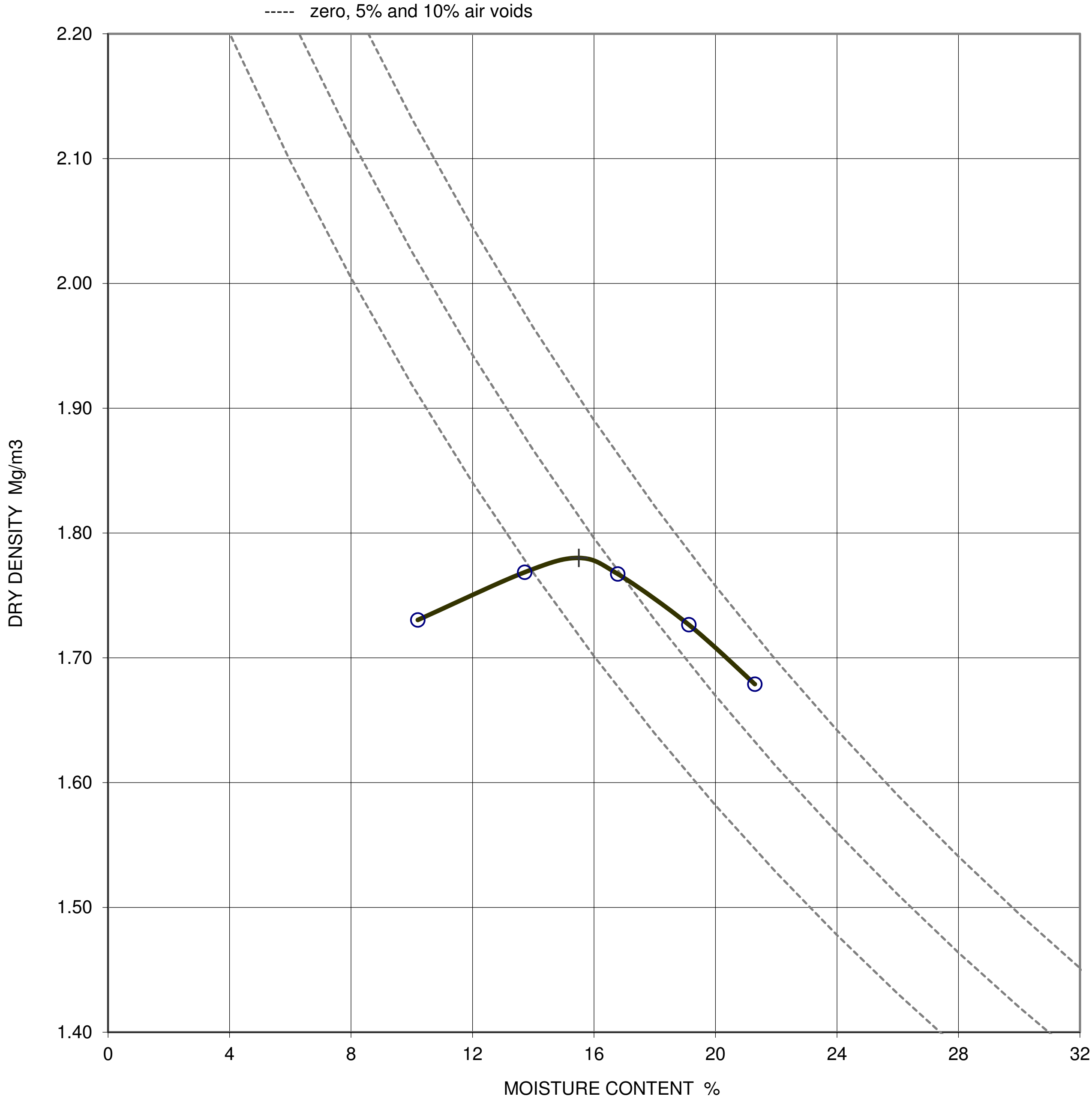


Voids ratio plotted at effective stress at the end of the stage.
Cro plotted at the average effective stress during the stage.

QA Ref SLD 3, 5/9 Rev 2.7	Project No A8015-18 Project Name VPI IMMINGHAM	**Figure** **HC**
		Printed: 31/07/2018 12:23

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-1820180409104626	Hole No	BH1
		Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B9
		Specimen Ref	



Soil description	Brown CLAY with chalk fragments.	
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	
Preparation	Original material was natural, single sample tested	
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	0	%
Particle density	2.71	measured - small pyknometer
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.78

Optimum moisture content, %
16

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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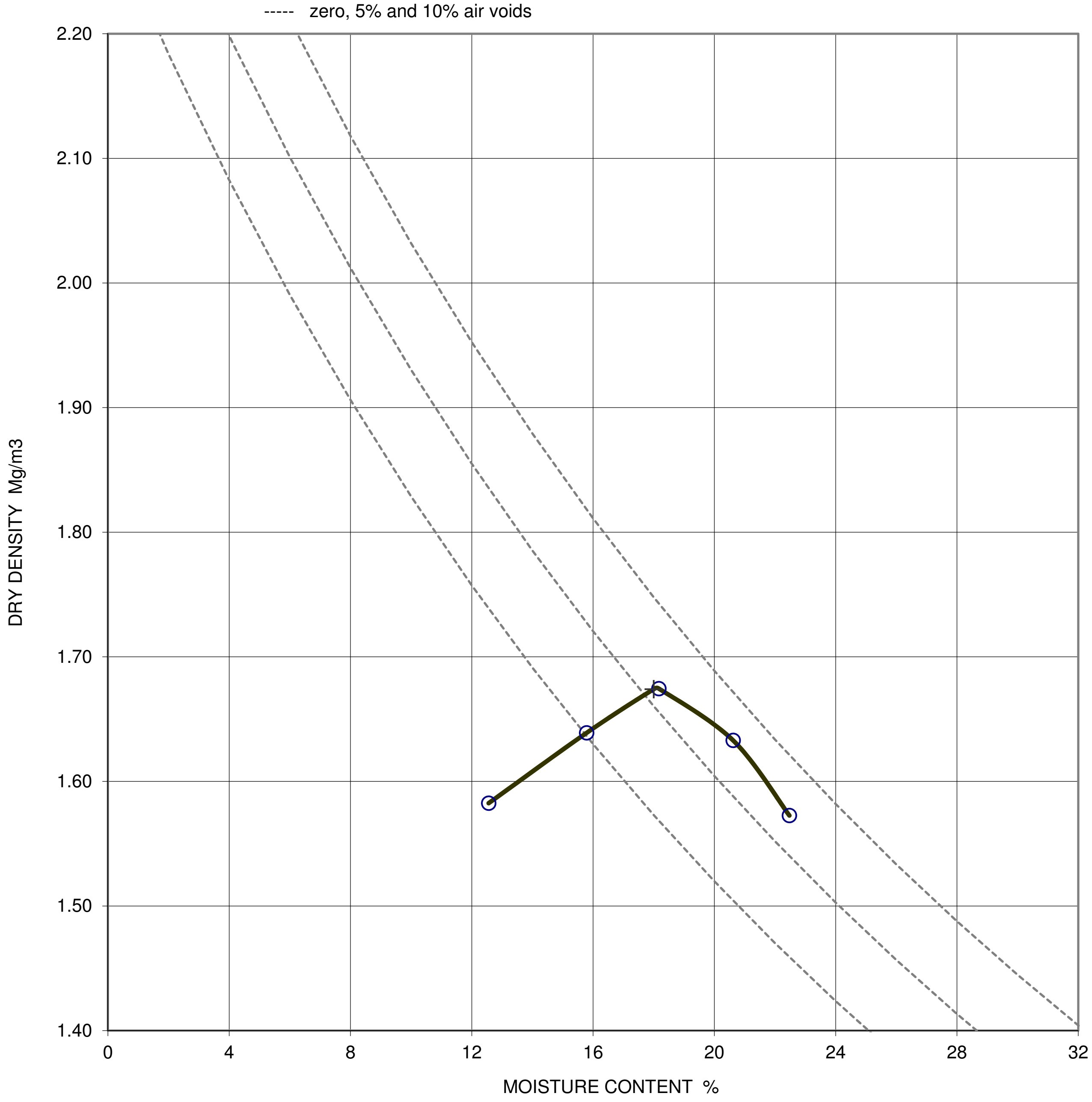
02/07/2018 15:44

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-1820180418120410	Hole No	BH5
		Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B4
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material wassingle sample tested

Material > 37.5mm	0	%
Material < 37.5mm > 20mm	0	%
Particle density	2.55	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.67

Optimum moisture content, %
18

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

COMPL

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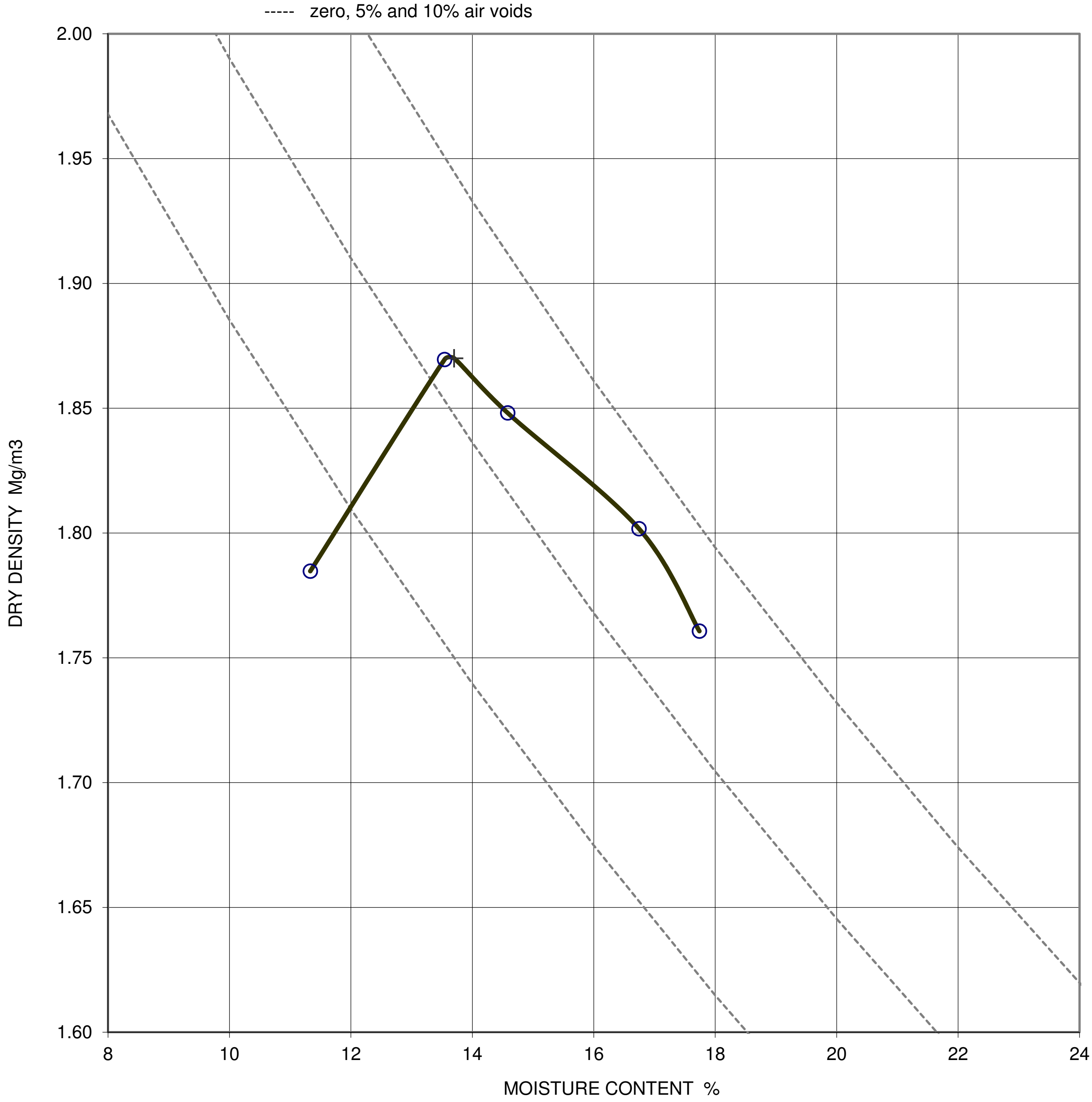
02/07/2018 15:45

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180413084026

Hole No	TP1
Sample Depth (m BGL)	0.10 - 0.30
Sample Type and No	B2
Specimen Ref	



Soil description	Brown slightly sandy gravelly CLAY.	
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	
Preparation	Original material was natural, single sample tested	
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	4	%
Particle density	2.65	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.87

Optimum moisture content, %
14

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

1157

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

COMPL

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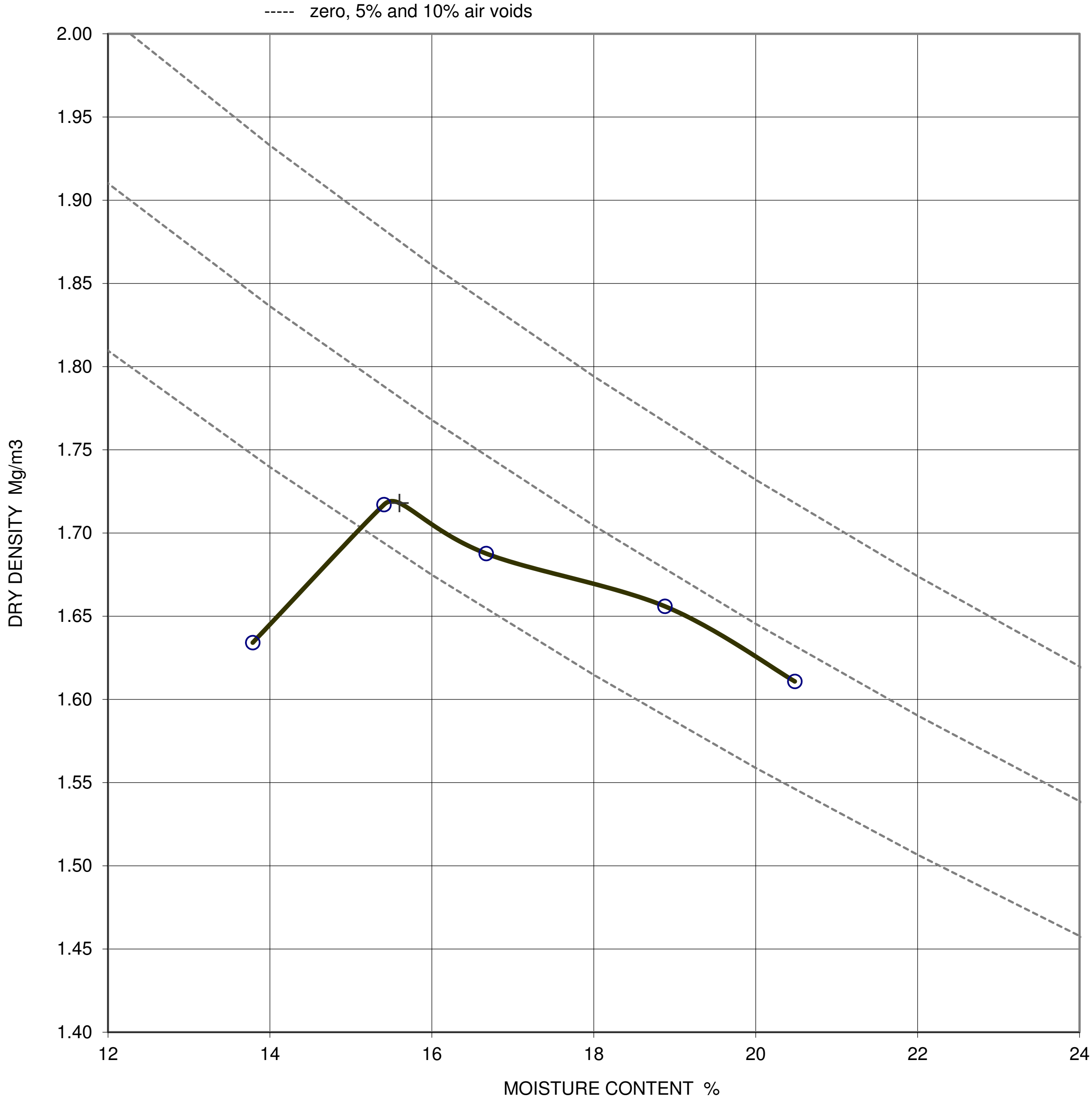
02/07/2018 15:45

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180410084322	Hole No	TP3
		Sample Depth (m BGL)	0.10 - 0.20
		Sample Type and No	B2
		Specimen Ref	



Soil description	Brown slightly sandy CLAY.		
Test method	BS 1377:part 4:1990: clause 3.6, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm	0	%	
Material < 37.5mm > 20mm	8	%	
Particle density	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3

1.72

Optimum moisture content, %

16

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

COMPL

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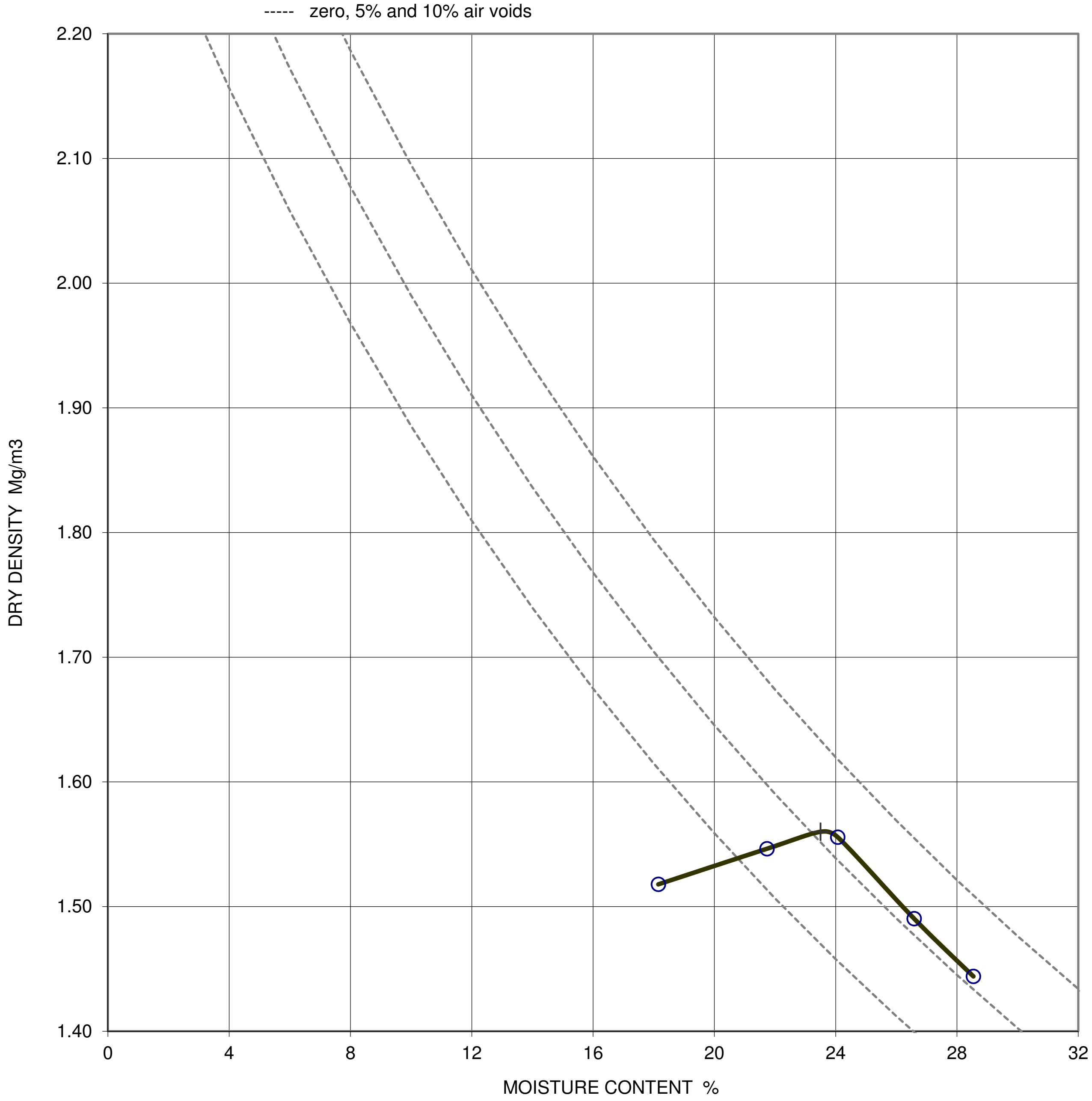
05/07/2018 11:42

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180410090003	Hole No	TP5
		Sample Depth (m BGL)	0.10 - 0.20
		Sample Type and No	B2
		Specimen Ref	



Soil description	Greenish brown slightly sandy slightly gravelly CLAY.	
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	
Preparation	Original material was natural, single sample tested	
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	1	%
Particle density	2.65	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.56

Optimum moisture content, %
24

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

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Project No	A8015-18
Project Name	VPI IMMINGHAM

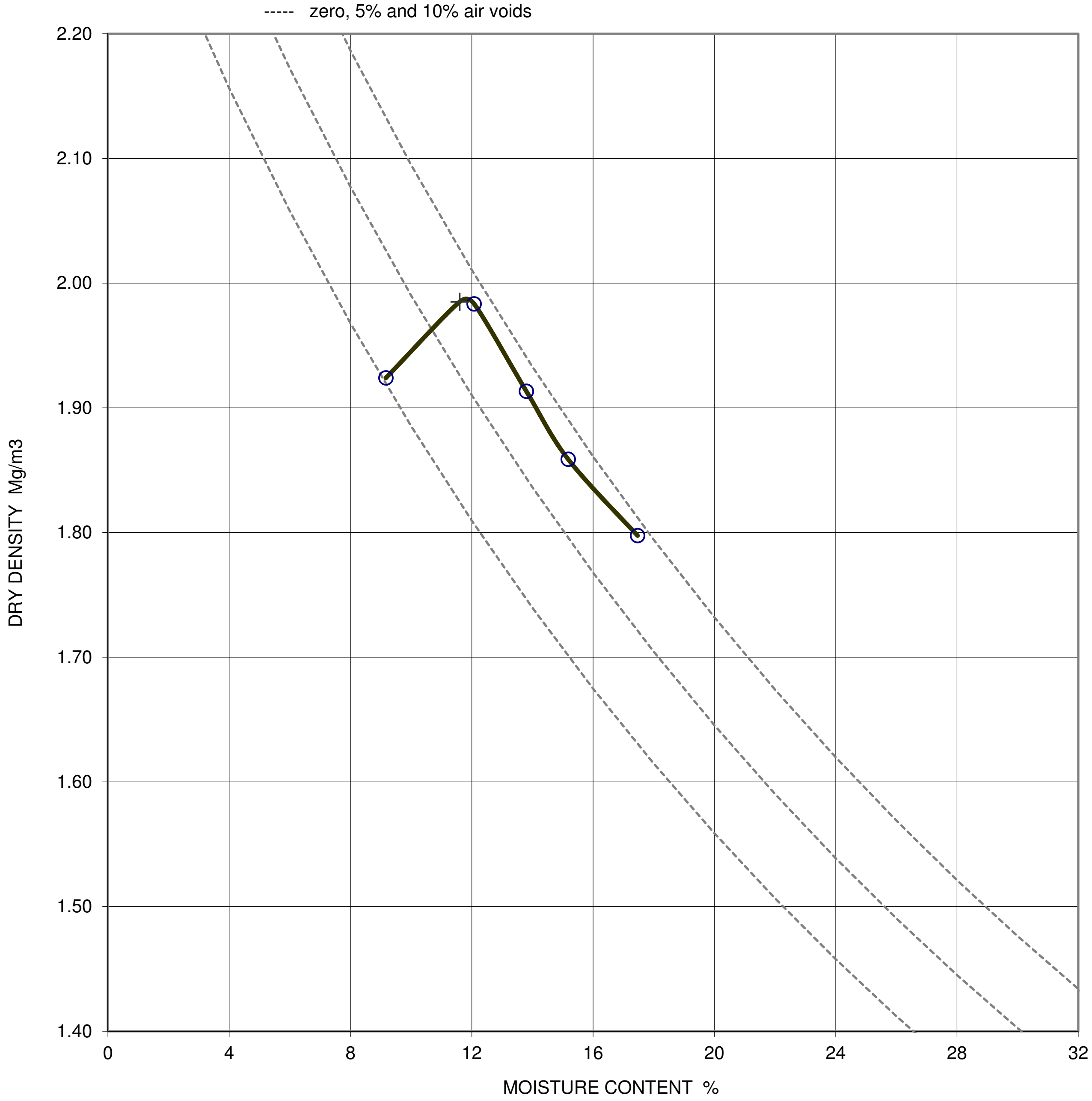
Figure

COMPL

Printed:
02/07/2018 15:46

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180410091510	Hole No	TP9
		Sample Depth (m BGL)	0.30 - 0.40
		Sample Type and No	B4
		Specimen Ref	



Soil description	Light brown slightly sandy slightly gravelly CLAY.		
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm	0	%	
Material < 37.5mm > 20mm	15	%	
Particle density	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3
1.99

Optimum moisture content, %
12

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

1157

Project No A8015-18
Project Name VPI IMMINGHAM

Figure
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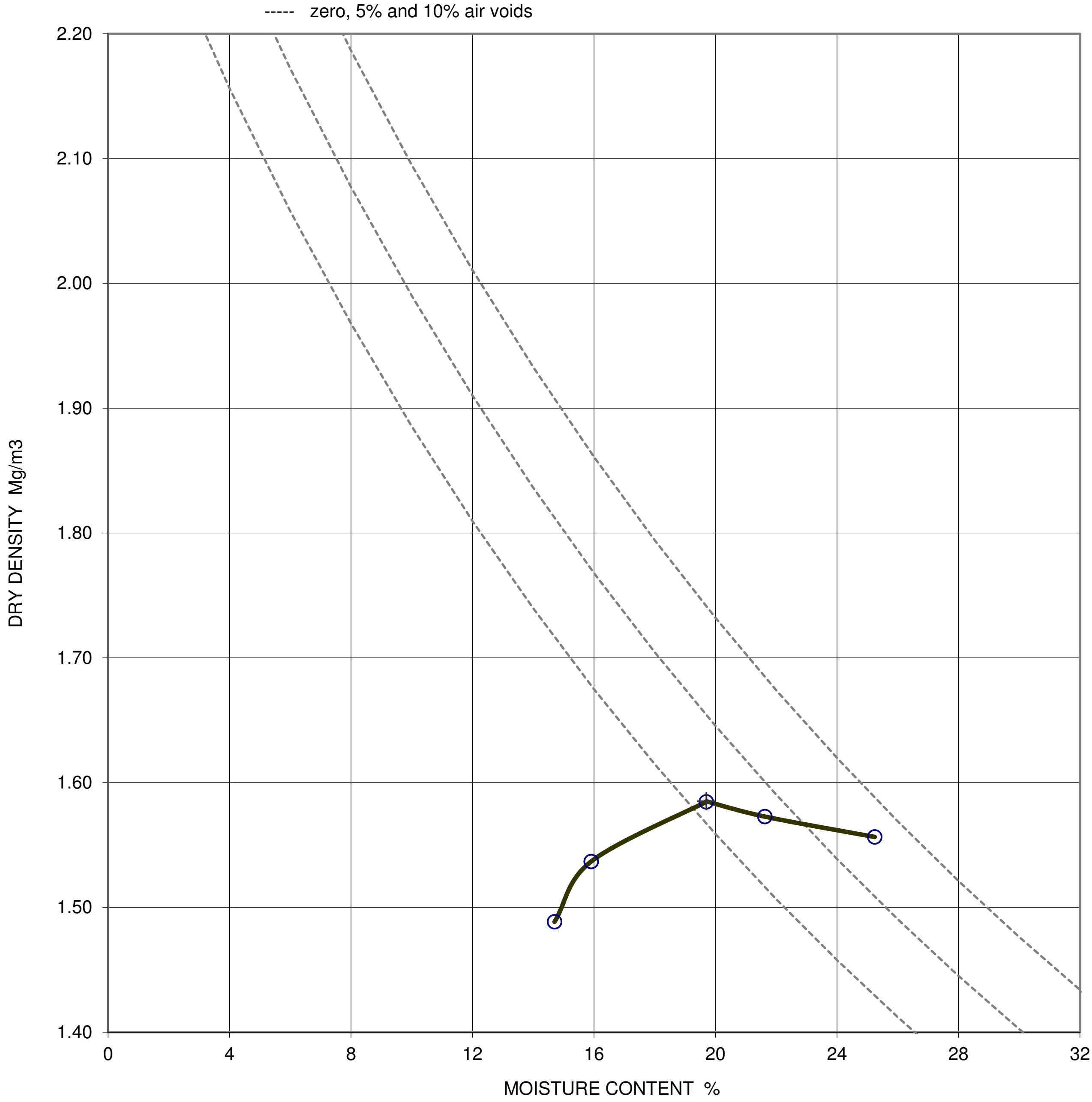
02/07/2018 15:47

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180413014653	Hole No	TT1
		Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	



Soil description Brown slightly sandy slightly gravelly CLAY.

Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	
Preparation	Original material wassingle sample tested	
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	3	%
Particle density	2.65	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.59

Optimum moisture content, %
20

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

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1157

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Project No A8015-18
Project Name VPI IMMINGHAM

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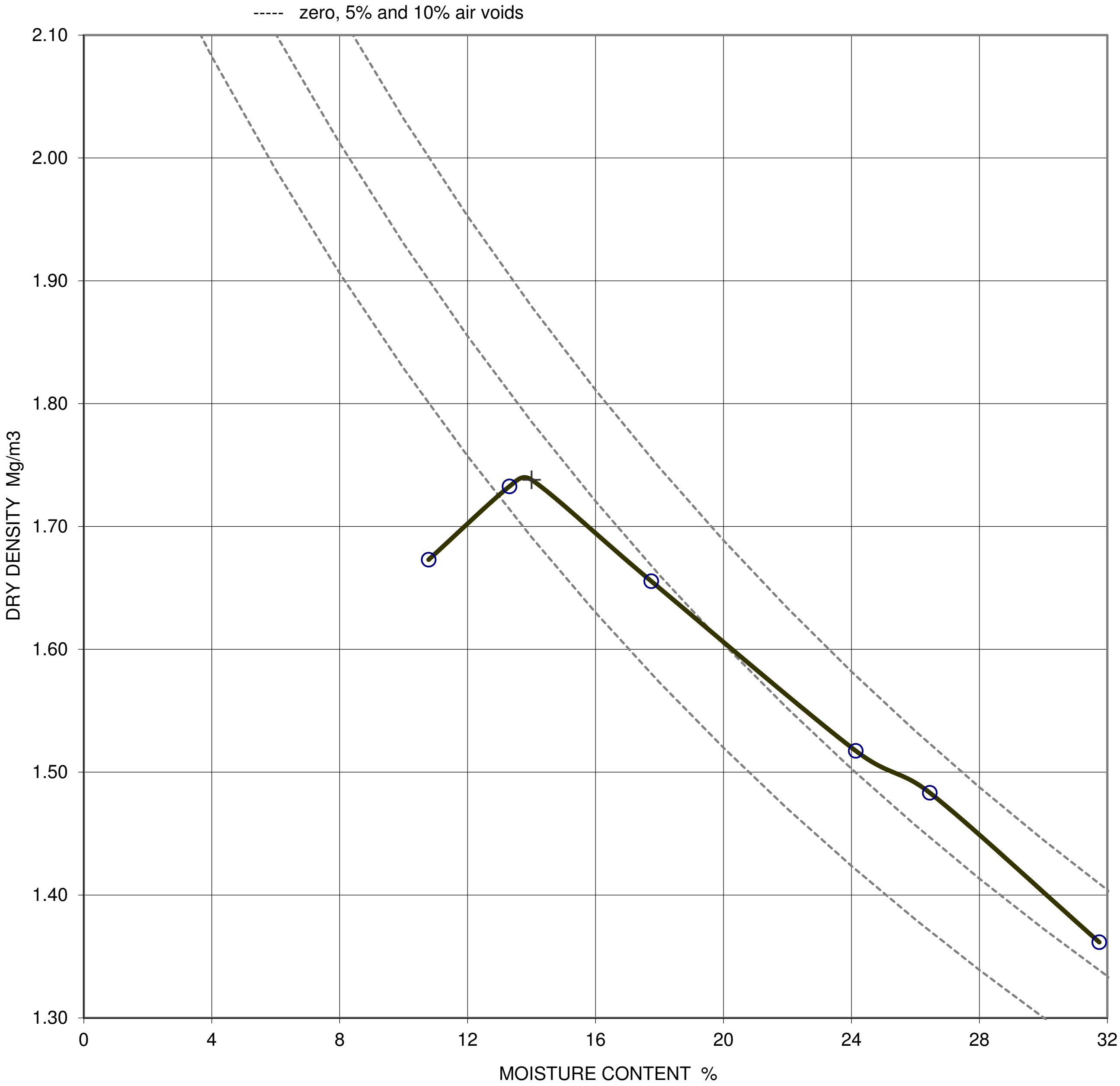
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID: A8015-1820180409104548

Hole No	BH1
Sample Depth (m BGL)	0.50 - 0.70
Sample Type and No	B4
Specimen Ref	



Soil description	Greyish brown slightly sandy slightly gravelly CLAY.		
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould		
Preparation	Original material was natural, separate specimens tested		
Material > 37.5mm		0	%
Material < 37.5mm > 20mm		0	%
Particle density		2.55	assumed
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3
1.74

Optimum moisture content, %
14

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

1157

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure
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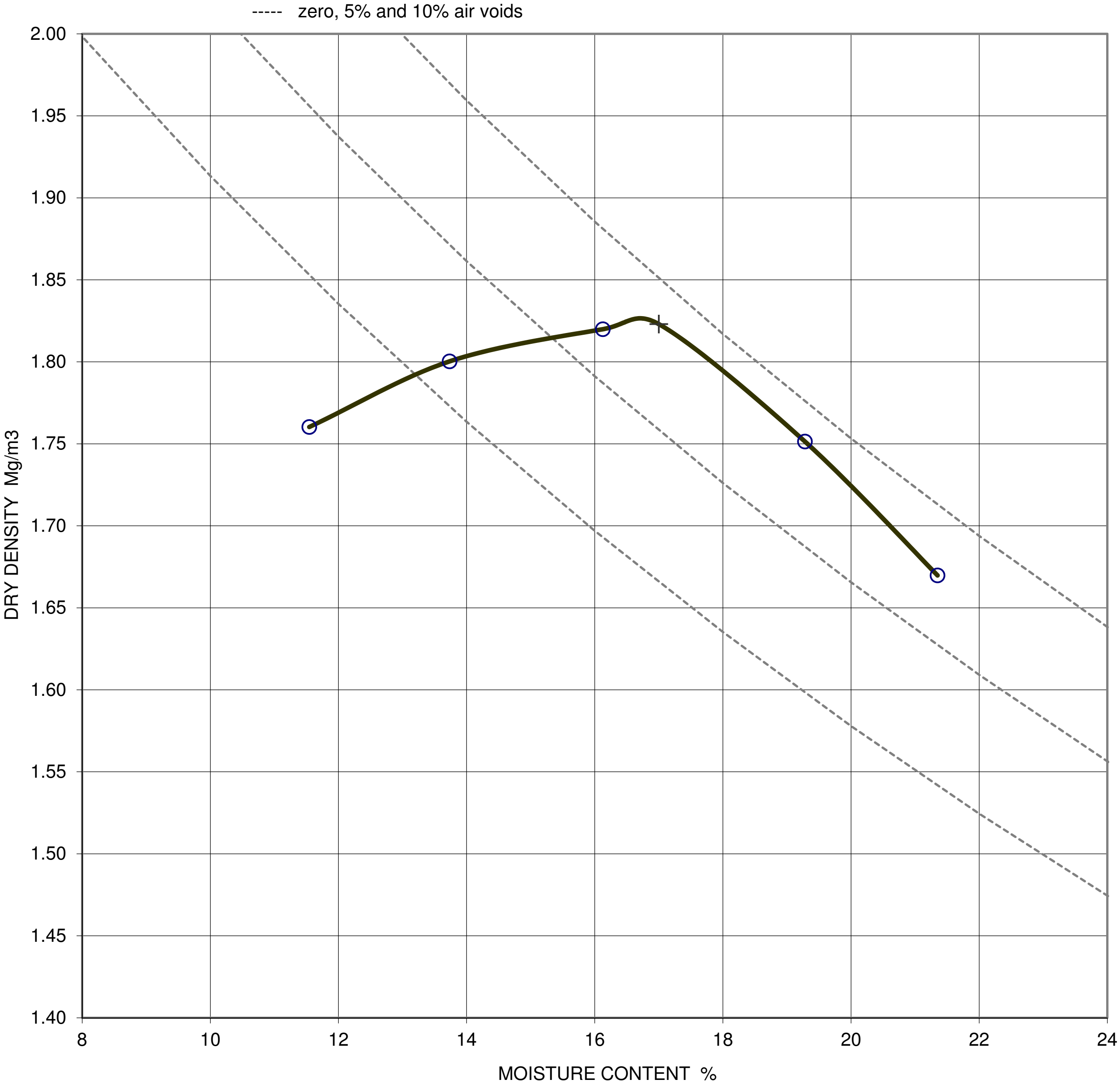
02/07/2018
15:37

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID: A8015-1820180413011454	Hole No	BH2
		Sample Depth (m BGL)	1.80 - 2.25
		Sample Type and No	B10
		Specimen Ref	



Soil description	Brown slightly gravelly CLAY. Gravel is chalk	
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould	
Preparation	Original material was natural, single sample tested	
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	0	%
Particle density	2.70	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.82

Optimum moisture content, %
17

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

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1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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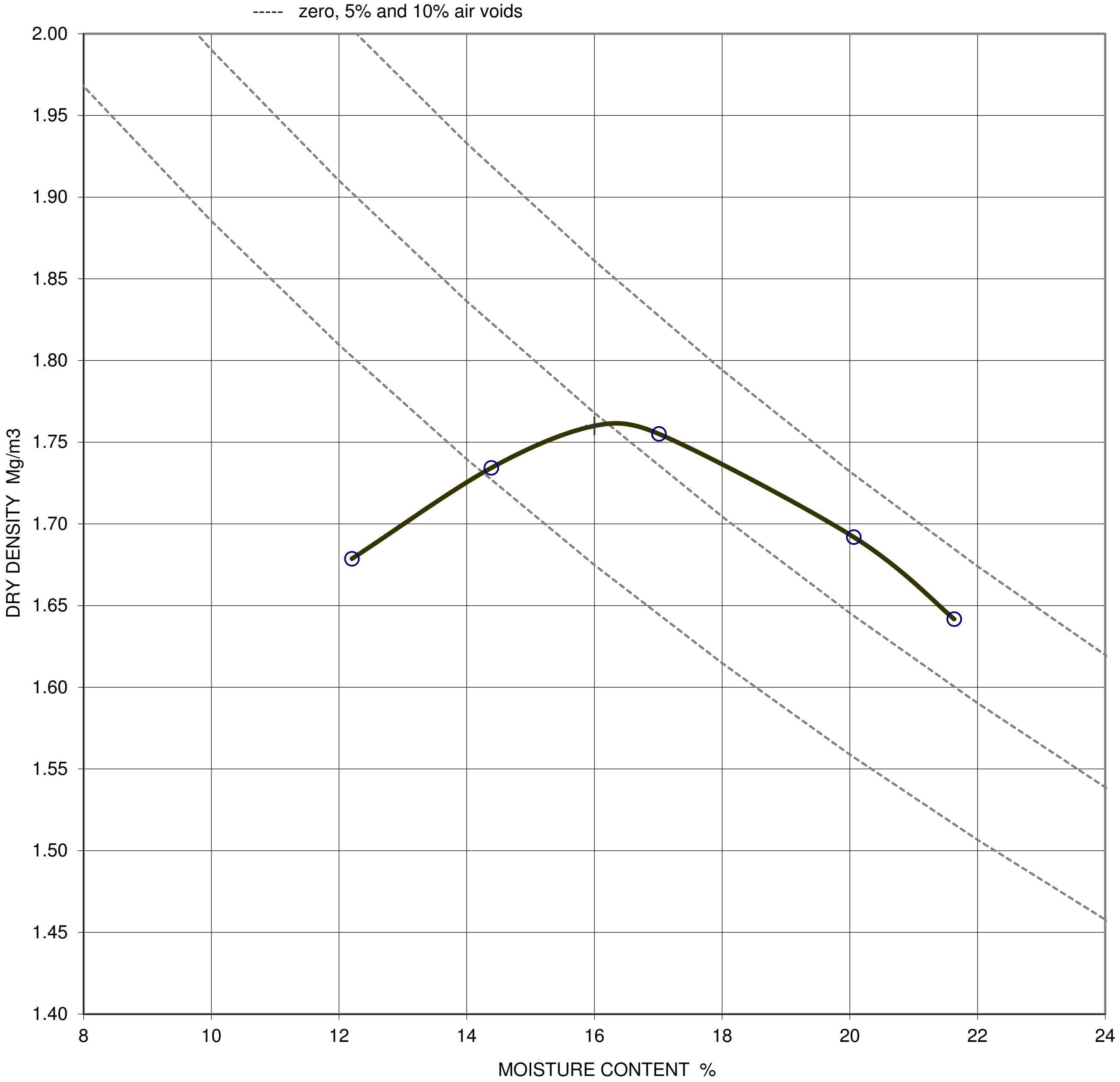
Printed:
02/07/2018
15:39

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH3
		Sample Depth (m BGL)	0.40 - 1.20
	A8015-1820180413102609	Sample Type and No	B1
		Specimen Ref	



Soil description Brown slightly sandy CLAY with chalk fragments.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m3
1.76

Optimum moisture content, %
16

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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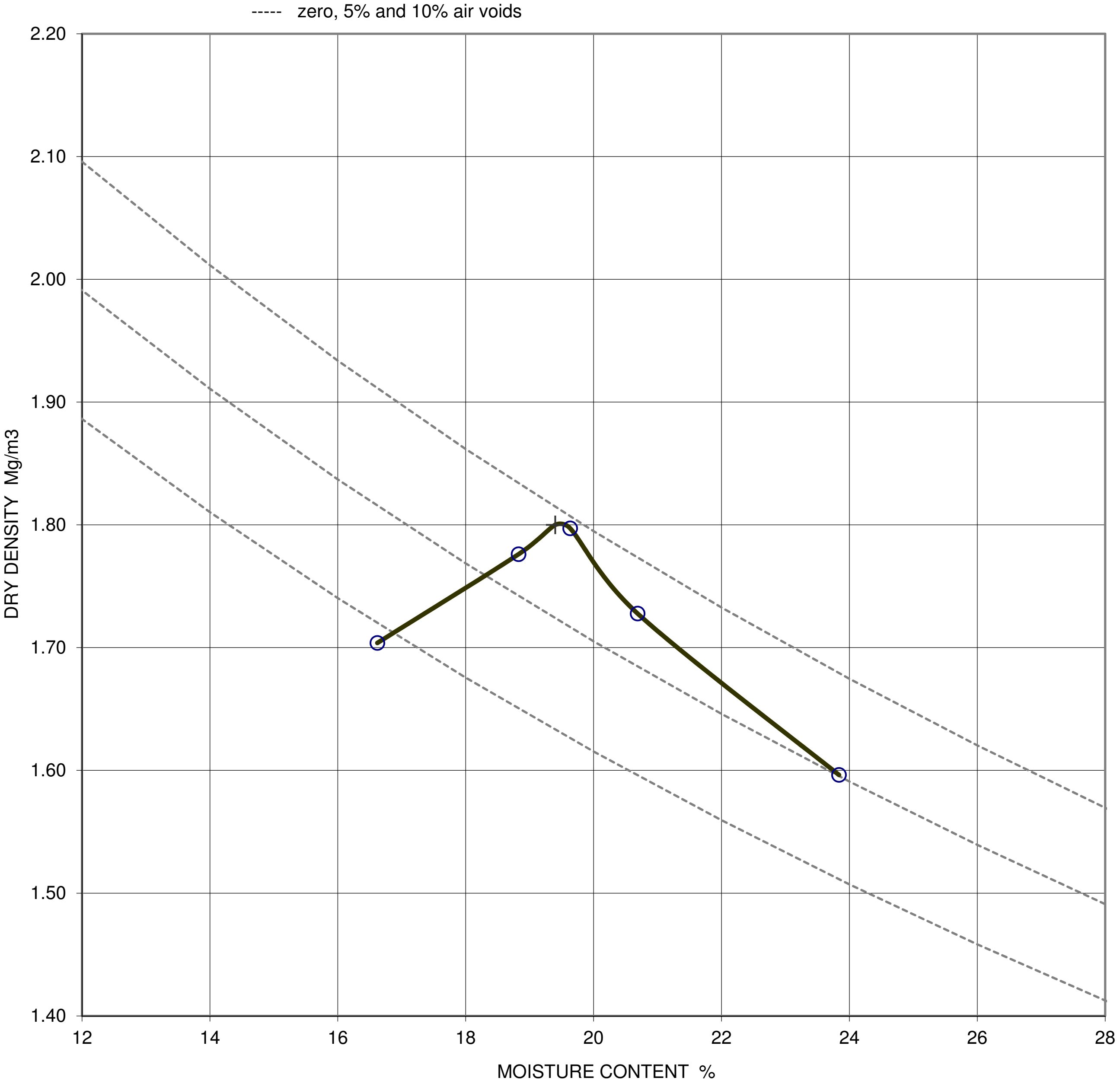
02/07/2018
15:40

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID: A8015-1820180409092443	Hole No	BH6
		Sample Depth (m BGL)	0.30 - 0.55
		Sample Type and No	B2
		Specimen Ref	



Soil description	Brown slightly sandy CLAY.		
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm		0	%
Material < 37.5mm > 20mm		0	%
Particle density		2.80	assumed
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3
1.80

Optimum moisture content, %
19

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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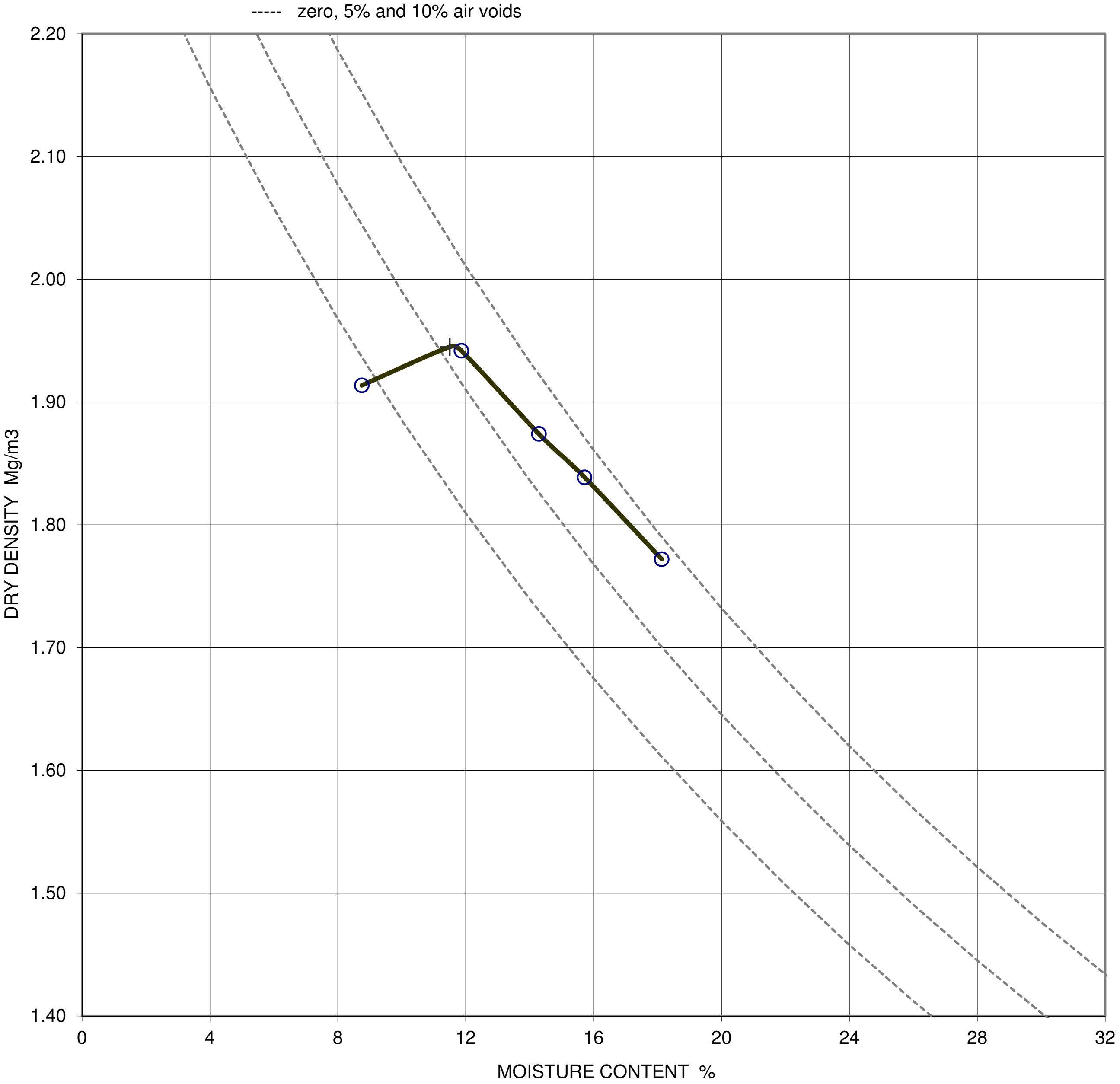
05/07/2018
11:41

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180408084806	Hole No	TP10
		Sample Depth (m BGL)	0.40 - 0.60
		Sample Type and No	B4
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm	0	%
Material < 37.5mm > 20mm	0	%
Particle density	2.65	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.95

Optimum moisture content, %
12

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure
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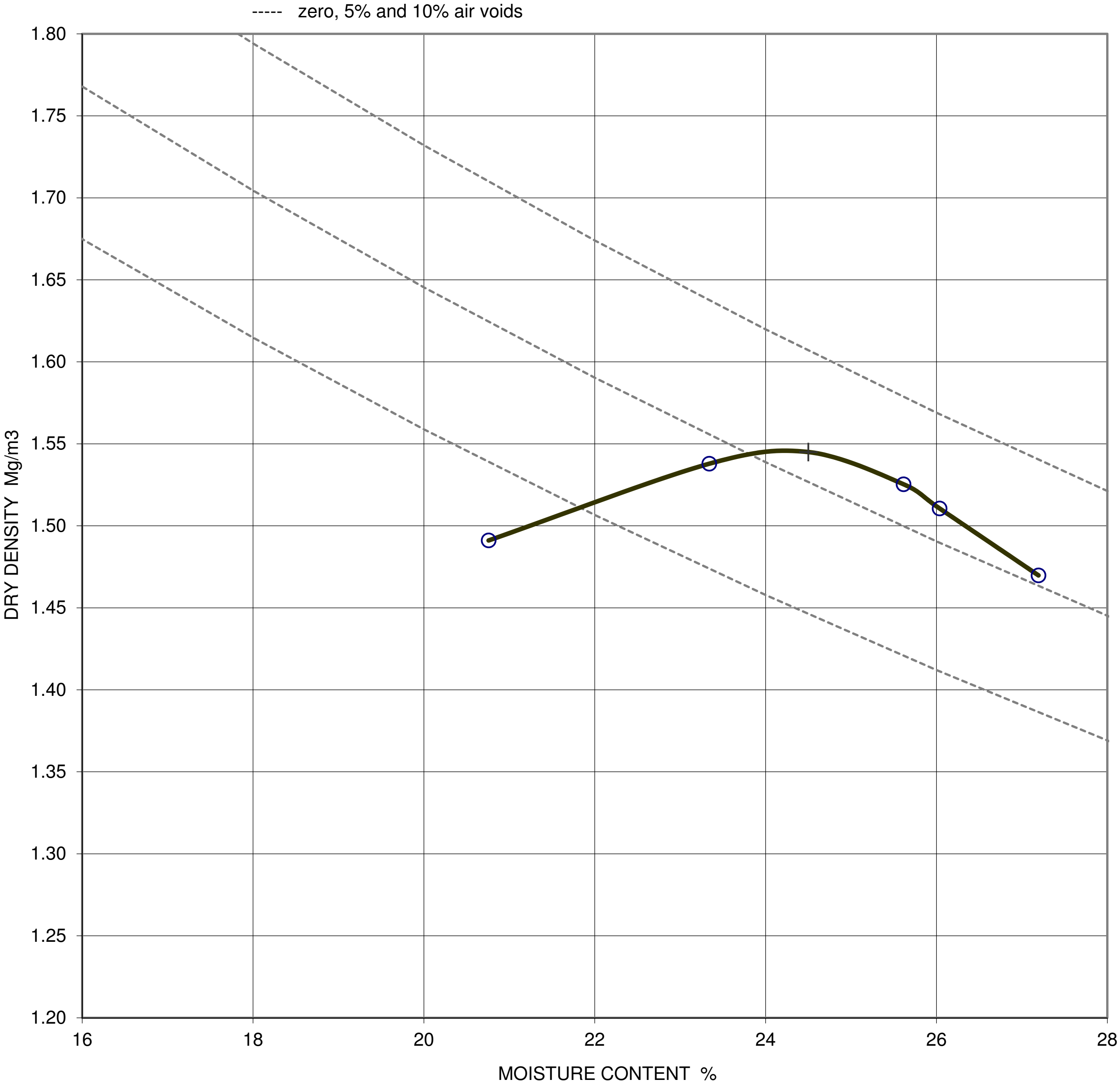
02/07/2018
15:40

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP2
		Sample Depth (m BGL)	0.10 - 0.30
	A8015-18-20180413090338	Sample Type and No	B2
		Specimen Ref	



Soil description	Dark brown slightly gravelly silty CLAY.		
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm		0	%
Material < 37.5mm > 20mm		4	%
Particle density		2.65	assumed
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3
1.55

Optimum moisture content, %
25

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

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1157

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Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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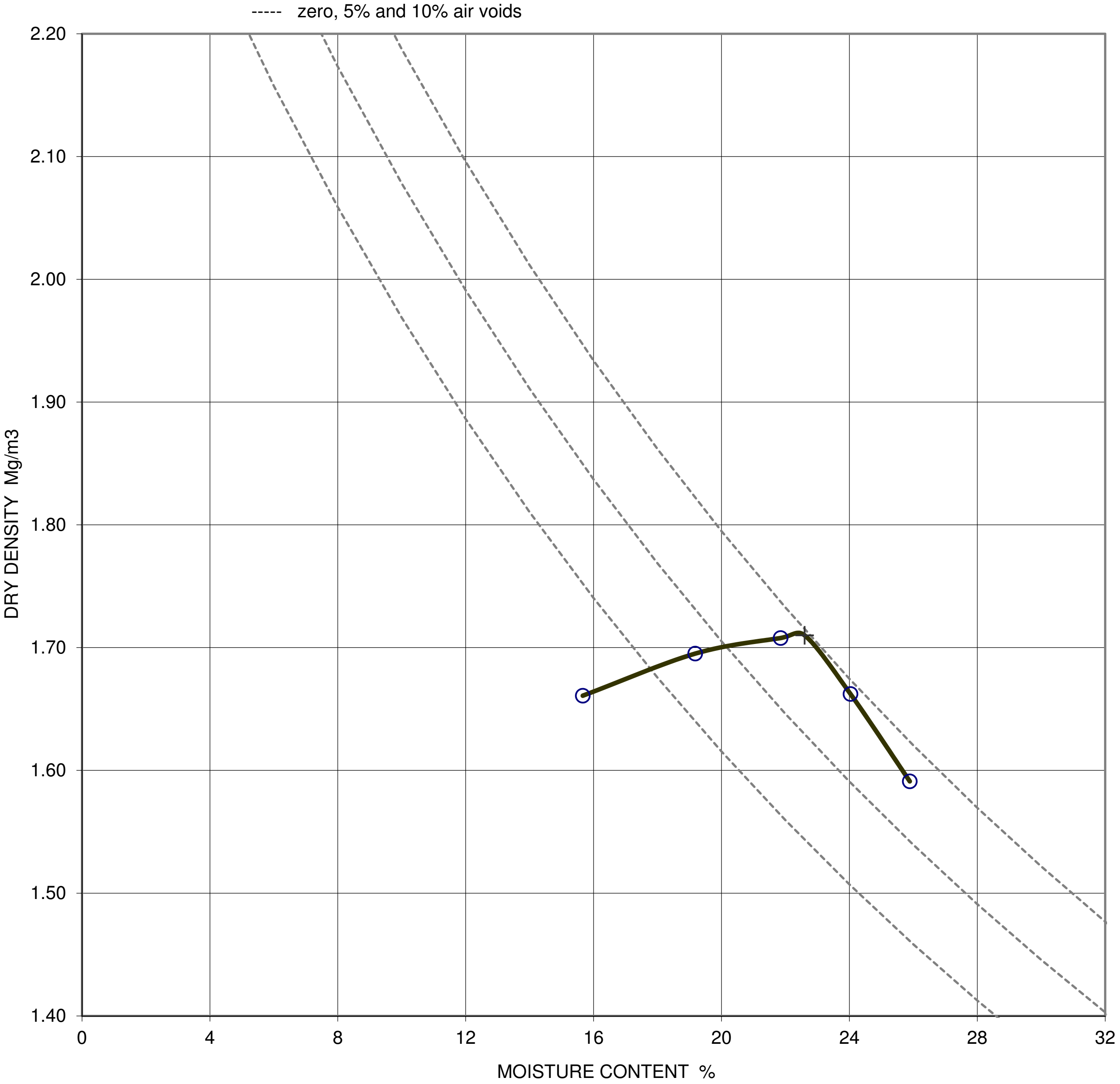
06/07/2018
07:56

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP4
		Sample Depth (m BGL)	0.10 - 0.30
	A8015-18-20180410075427	Sample Type and No	B2
		Specimen Ref	



Soil description	Brown silty CLAY.		
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm		0	%
Material < 37.5mm > 20mm		0	%
Particle density		2.80	assumed
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3
1.71

Optimum moisture content, %
23

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No A8015-18
Project Name VPI IMMINGHAM

Figure
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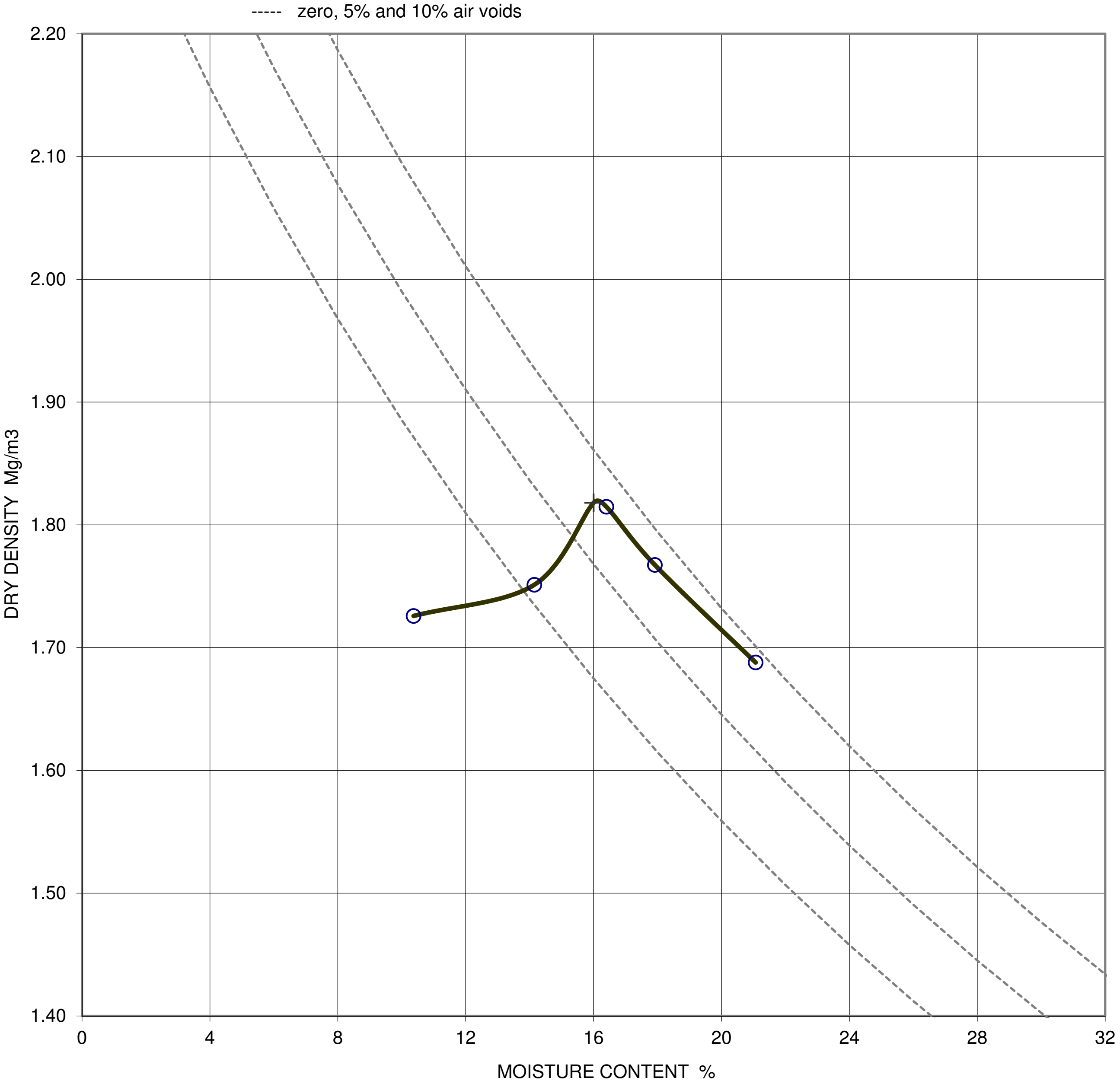
02/07/2018
15:42

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180410082549	Hole No	TP6
		Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	



Soil description	Brown CLAY with chalk fragments.	
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould	
Preparation	Original material was natural, single sample tested	
Material > 37.5mm	0	%
Material < 37.5mm > 20mm	2	%
Particle density	2.65	assumed
Remarks		

Derived Parameters +

Maximum dry density, Mg/m3
1.82

Optimum moisture content, %
16

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

1157

Project No A8015-18
Project Name VPI IMMINGHAM

Figure
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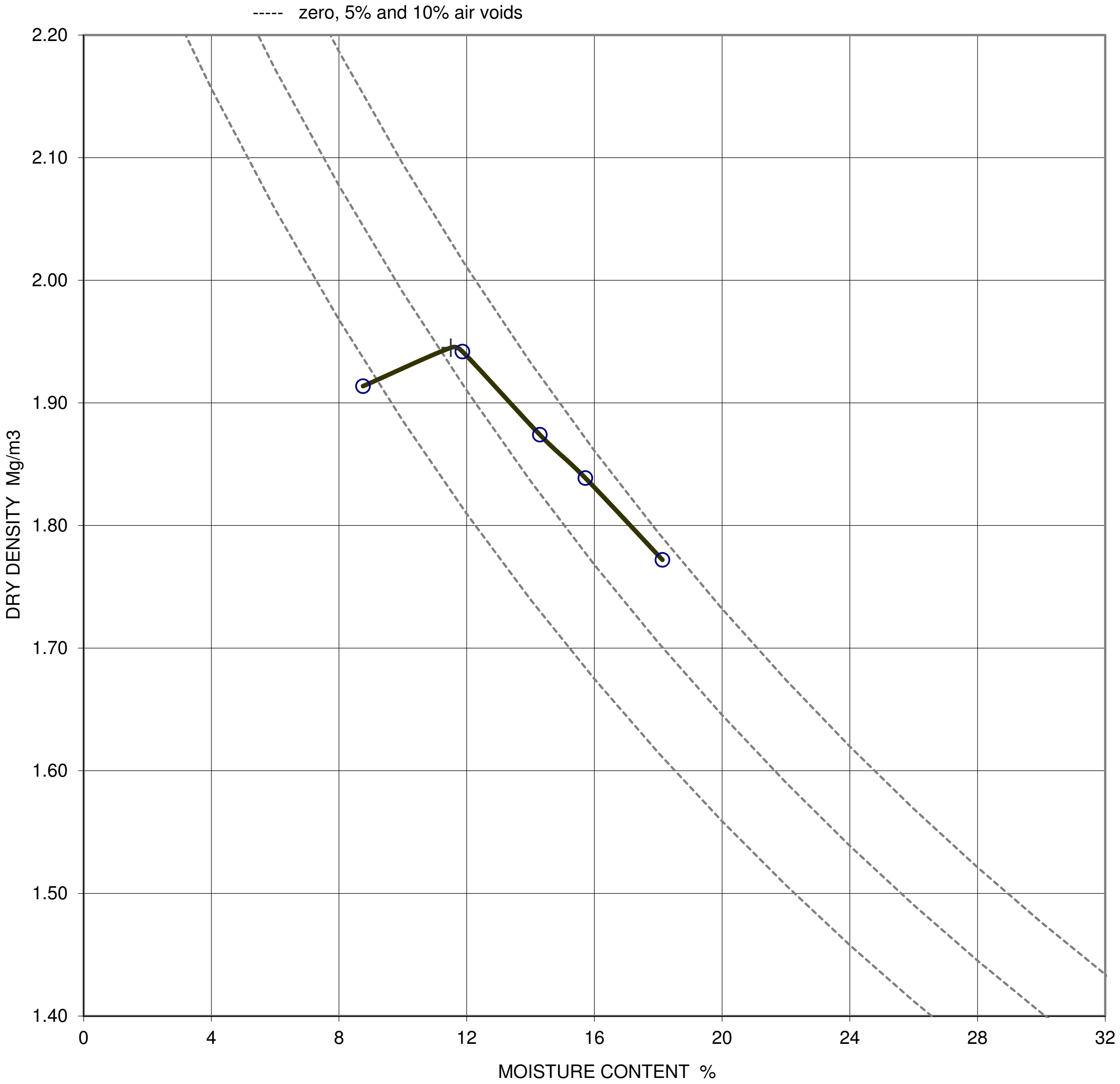
02/07/2018
15:42

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID: A8015-18-20180408084806	Hole No	TP10
		Sample Depth (m BGL)	0.40 - 0.60
		Sample Type and No	B4
		Specimen Ref	



Soil description	Brown slightly sandy CLAY.		
Test method	BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm		0	%
Material < 37.5mm > 20mm		0	%
Particle density		2.65	assumed
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3
1.95

Optimum moisture content, %
12

QA Ref
SLD 4, 3.5/6
Rev 2.5
Sep 17

UKAS TESTING
1157

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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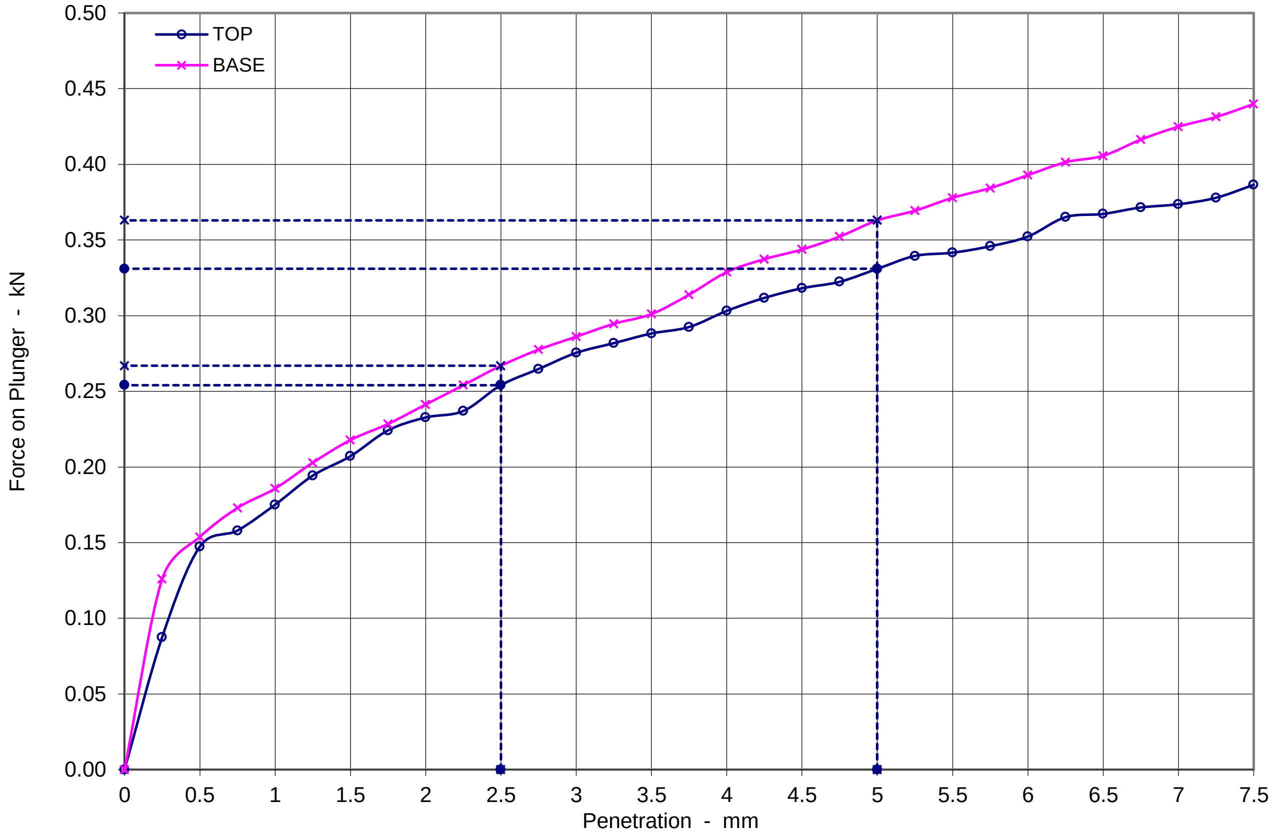
02/07/2018
15:40

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	BH1
		Sample Depth (m)	1.00 - 1.20
	A8015-1820180409104552	Sample Type and No	B5
		Specimen Ref	1



Soil description	Brown slightly sandy slightly gravelly CLAY with rare rootlets.

Test Conditions		
Sample Retained on 20 mm sieve	%	27

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	22.0
Bulk Density	Mg/m³	2.02
Dry Density	Mg/m³	1.66
Moisture Content - TOP	%	22.0
Moisture Content - BASE	%	21.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.9	2.0
5	1.7	1.8
Accepted CBR %	**1.9**	**2.0**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No A8015-18
Project Name VPI IMMINGHAM

Figure

CBR

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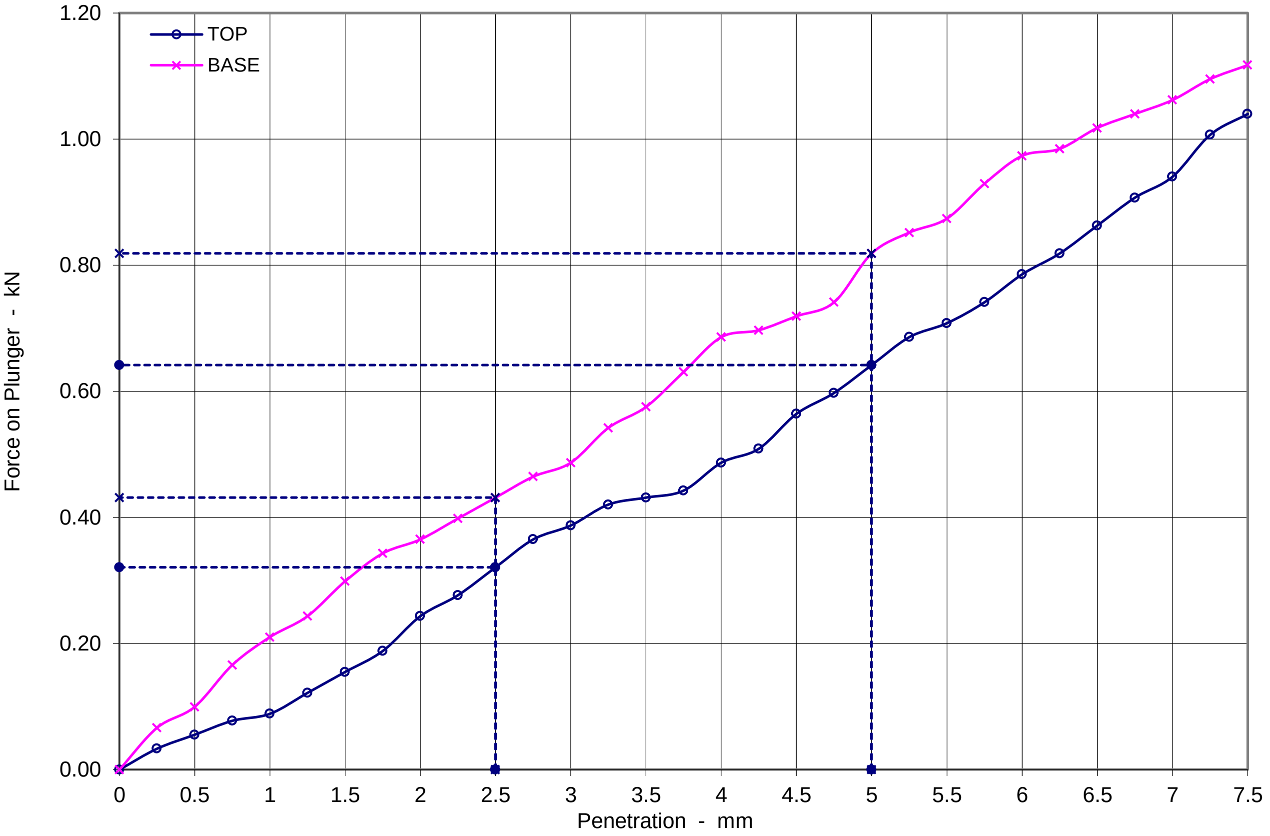
California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-1820180413011424	Hole No	BH2
		Sample Depth (m)	1.00 - 1.20
		Sample Type and No	B6
		Specimen Ref	1



Soil description	Brown slightly sandy CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	3

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	25.0
Bulk Density	Mg/m³	1.97
Dry Density	Mg/m³	1.58
Moisture Content - TOP	%	26.0
Moisture Content - BASE	%	24.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.4	3.3
5	3.2	4.1
Accepted CBR %	**3.2**	**4.1**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

CBR

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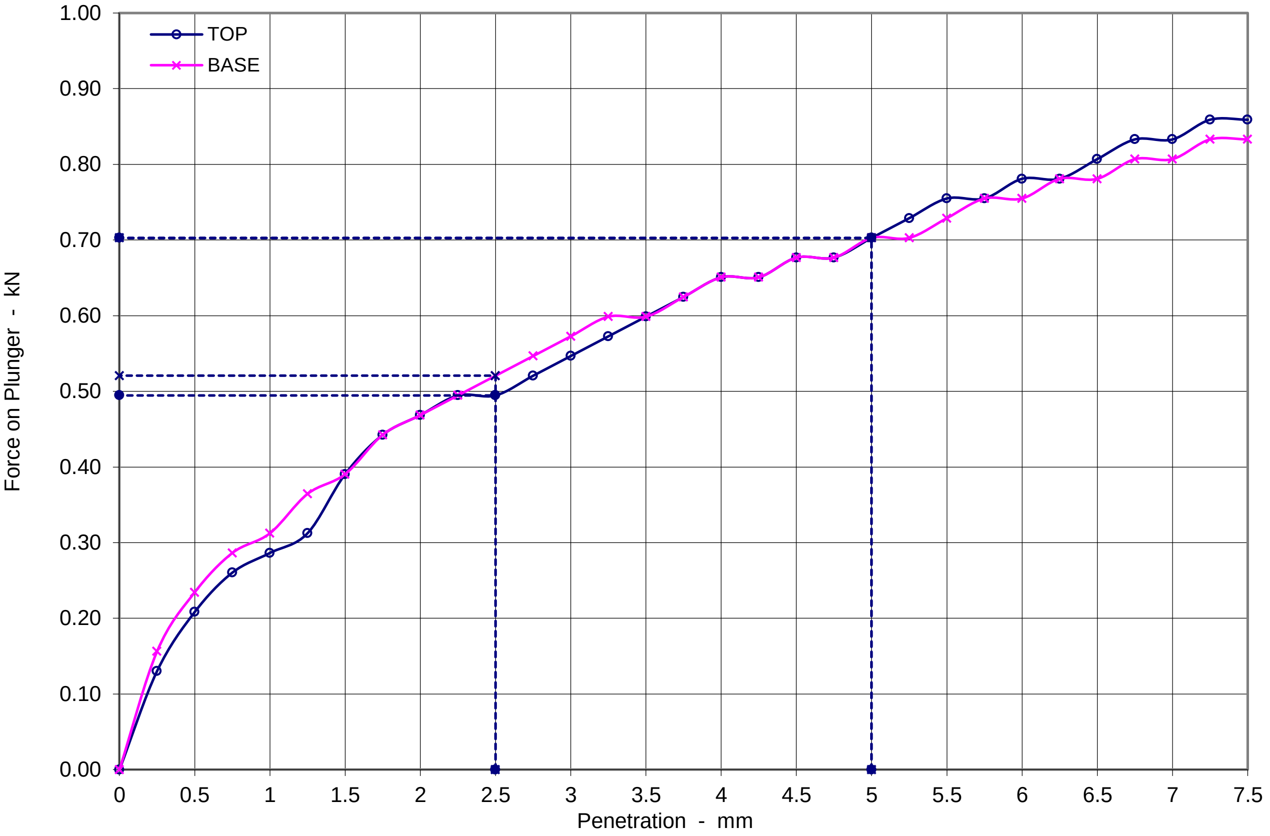
California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	BH3
		Sample Depth (m)	0.40 - 1.20
	A8015-1820180413102609	Sample Type and No	B1
		Specimen Ref	1



Soil description	Brown slightly sandy CLAY with chalk fragments.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Preparation	Method of Compaction		
	Undisturbed		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	21.0
Bulk Density	Mg/m³	2.03
Dry Density	Mg/m³	1.68
Moisture Content - TOP	%	22.0
Moisture Content - BASE	%	22.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.7	3.9
5	3.5	3.5

Accepted CBR %	**3.7**	**3.9**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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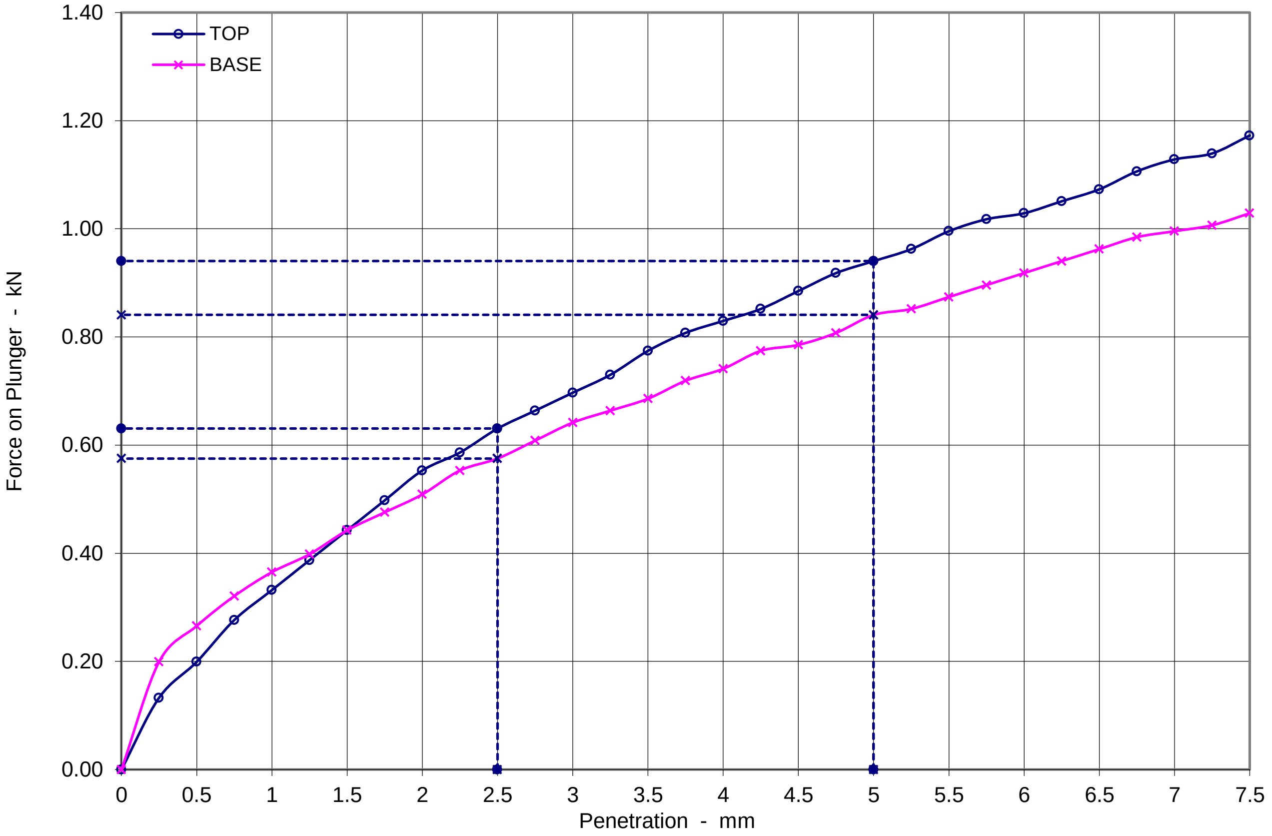
California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-1820180418115011	Hole No	BH4
		Sample Depth (m)	1.65 - 2.00
		Sample Type and No	B3
		Specimen Ref	1



Soil description	Brown slightly sandy CLAY with chalk fragments.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Preparation		
Method of Compaction		
Recompacted - Rammer compaction with specified effort (4.5kg)		
Soaked test		NO
Soaking Period	days	N/A
Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	19.0
Bulk Density	Mg/m³	2.12
Dry Density	Mg/m³	1.78
Moisture Content - TOP	%	20.0
Moisture Content - BASE	%	19.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	4.8	4.4
5	4.7	4.2
Accepted CBR %	**4.8**	**4.4**

QA Ref
SLR 2
Rev 2.7
Apr 15

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Project No	A8015-18
Project Name	VPI IMMINGHAM

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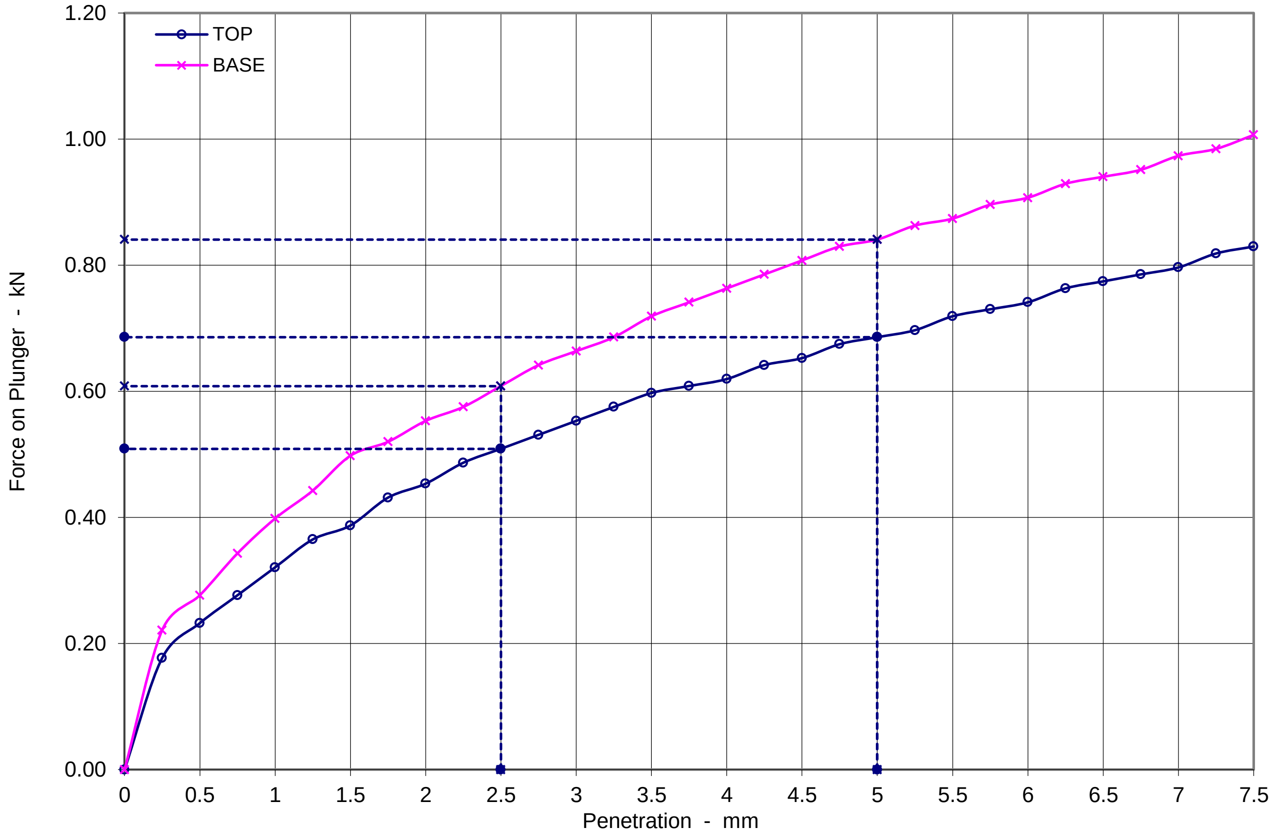
California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-18-20180413084055	Hole No	TP1
		Sample Depth (m)	0.70 - 0.90
		Sample Type and No	B4
		Specimen Ref	1



Soil description	Brown slightly sandy CLAY with occasional chalk fragments.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	23.0
Bulk Density	Mg/m³	1.98
Dry Density	Mg/m³	1.61
Moisture Content - TOP	%	22.0
Moisture Content - BASE	%	22.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.9	4.6
5	3.4	4.2

Accepted CBR %	**3.9**	**4.6**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

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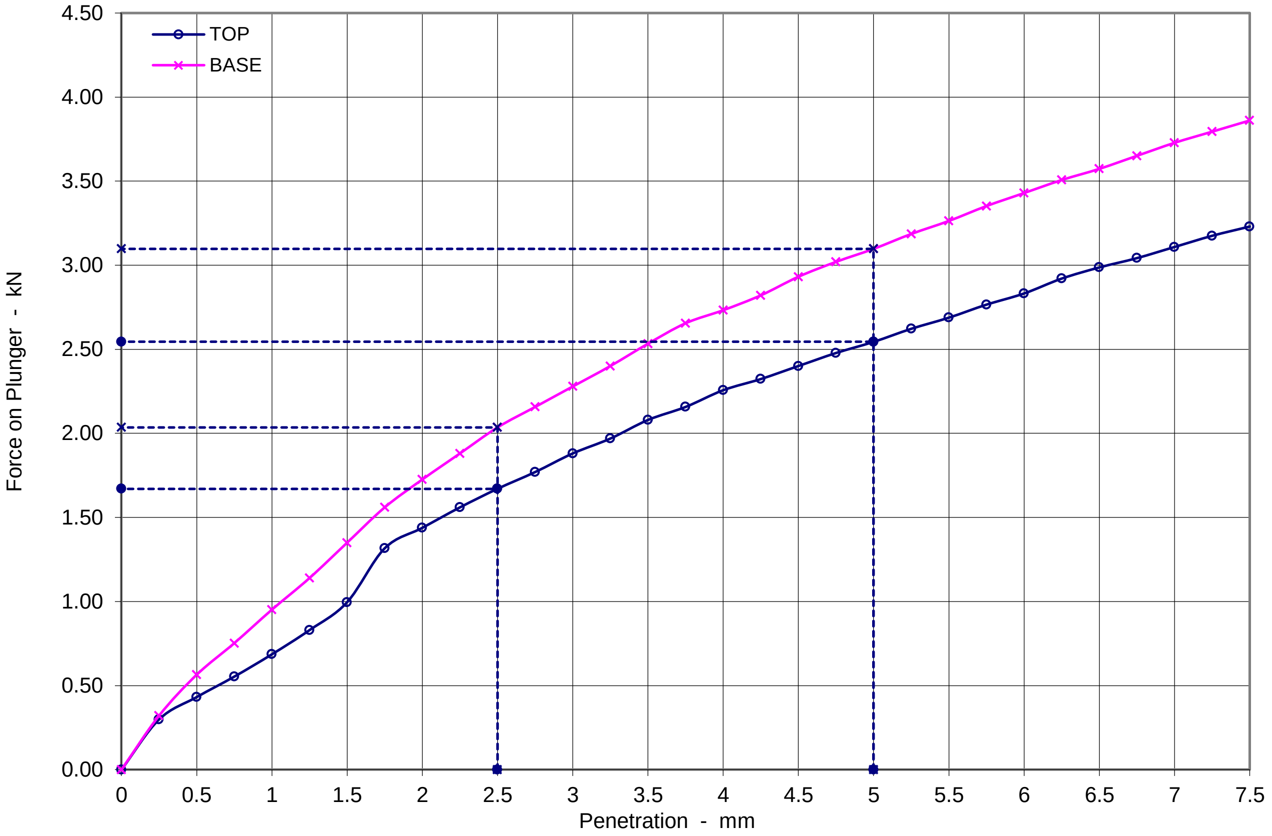
California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-18-20180413084231	Hole No	TP1
		Sample Depth (m)	3.40 - 3.60
		Sample Type and No	B10
		Specimen Ref	1



Soil description	Light brown slightly sandy CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	14.0
Bulk Density	Mg/m³	2.19
Dry Density	Mg/m³	1.92
Moisture Content - TOP	%	13.0
Moisture Content - BASE	%	13.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	13.0	15.0
5	13.0	15.0

Accepted CBR %	**13.0**	**15.0**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

Figure

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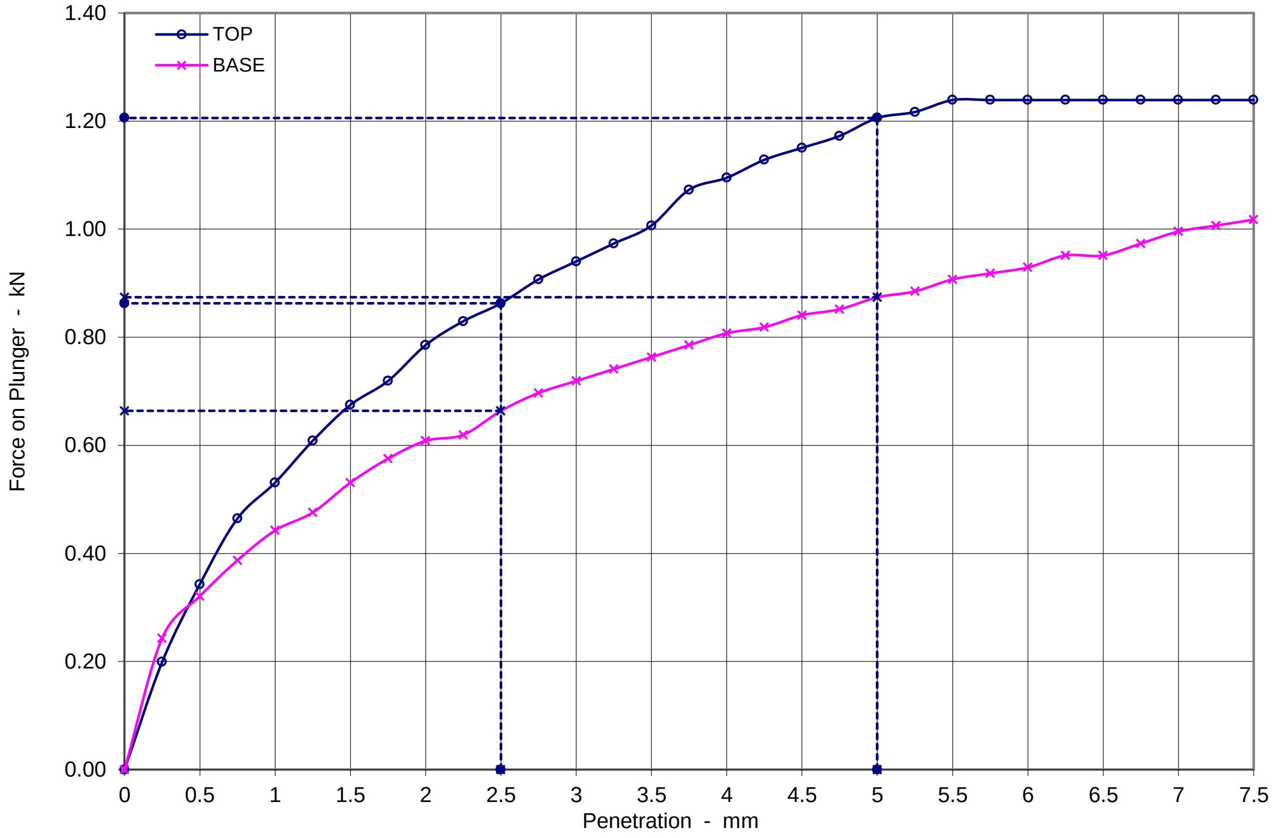
California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	TP2
		Sample Depth (m)	0.30 - 0.50
	A8015-18-20180413090359	Sample Type and No	B4
		Specimen Ref	1



Soil description	Brown slightly sandy slightly gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	20.0
Bulk Density	Mg/m³	1.92
Dry Density	Mg/m³	1.60
Moisture Content - TOP	%	21.0
Moisture Content - BASE	%	22.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	6.5	5.0
5	6.0	4.4
Accepted CBR %	**6.5**	**5.0**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

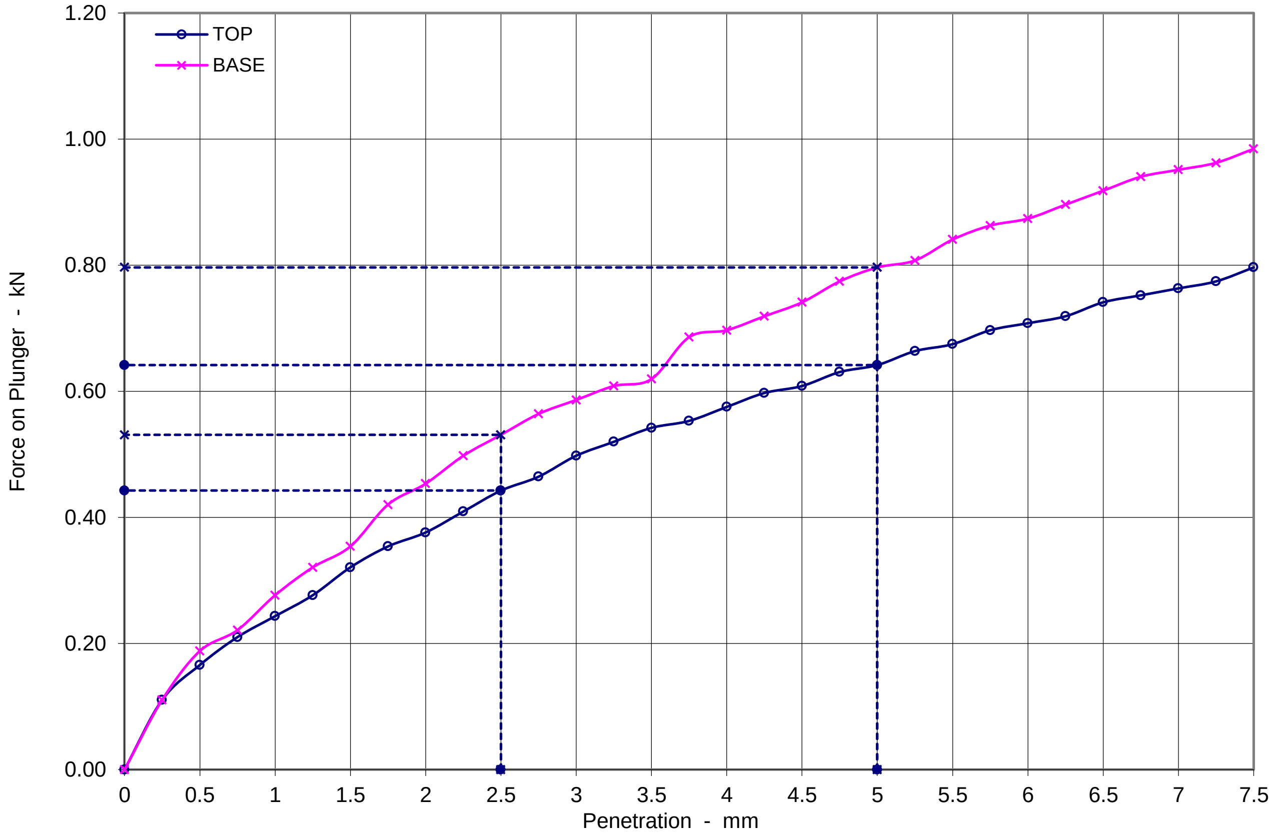
Figure

CBR

Printed: 14/08/2018 11:15

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	TP7
		Sample Depth (m)	1.30 - 1.60
	A8015-18-20180410092425	Sample Type and No	B4
		Specimen Ref	1



Soil description	Brown slightly sandy CLAY with chalk fragments.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	17.0
Bulk Density	Mg/m³	2.14
Dry Density	Mg/m³	1.83
Moisture Content - TOP	%	17.0
Moisture Content - BASE	%	17.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.4	4.0
5	3.2	4.0
Accepted CBR %	**3.4**	**4.0**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

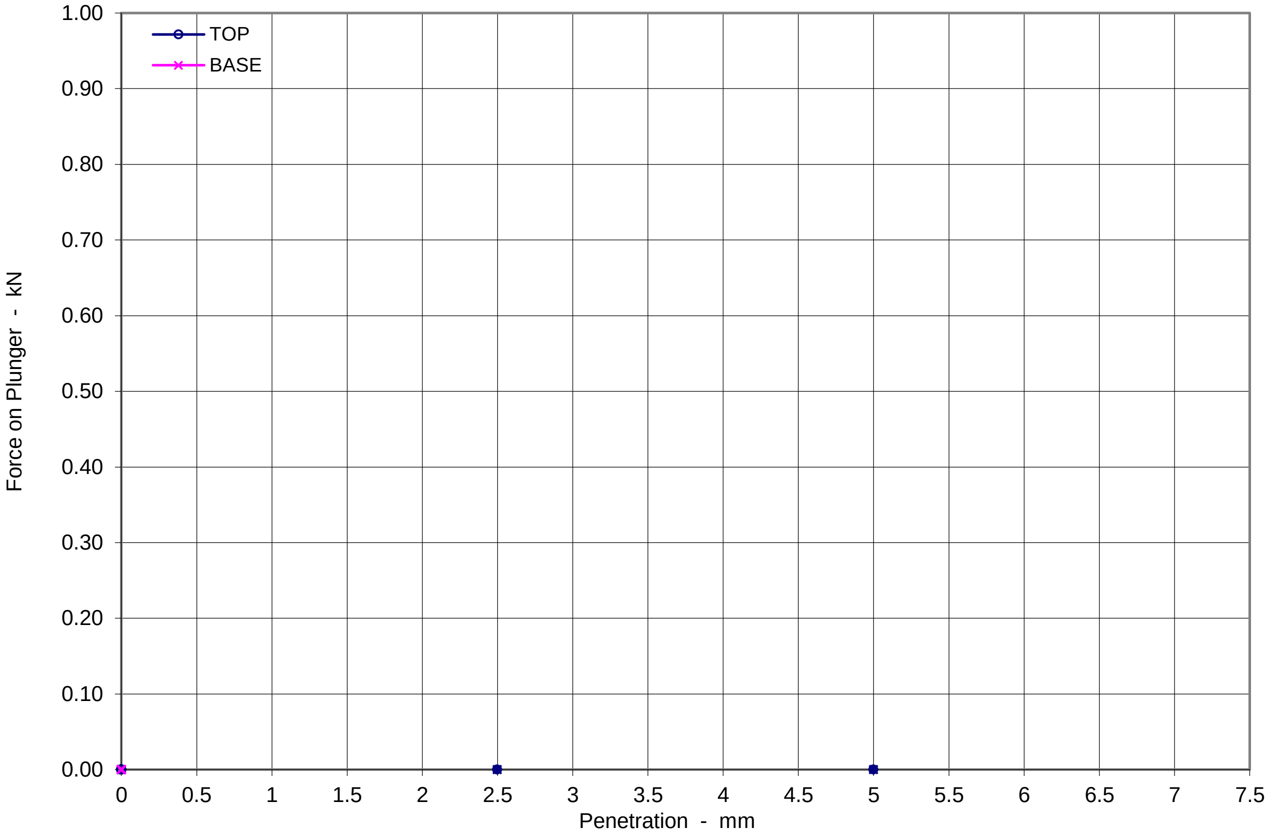
Figure

CBR

Printed: 14/08/2018 11:15

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-18-20180410074518	Hole No	TP8
		Sample Depth (m)	3.70 - 3.90
		Sample Type and No	B12
		Specimen Ref	1



Soil description	Brown SAND with occasional chalk fragments.

Test Conditions		
Sample Retained on 20 mm sieve	%	

	Method of Compaction		
Preparation	Undisturbed		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	
	kPa	0

Sample Conditions		
Initial Moisture Content	%	
Bulk Density	Mg/m³	
Dry Density	Mg/m³	
Moisture Content - TOP	%	
Moisture Content - BASE	%	

Penetration mm	CBR Values %	
	TOP	BASE
2.5	-	-
5.0	-	-
Accepted CBR %	**-**	**-**

Notes :

Test attempted @ NMC & various dryer MC's, sample protruded from mould at NMC & dryer MC's when CBR testing equipment came into contact with sample.

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No A8015-18

Project Name VPI IMMINGHAM

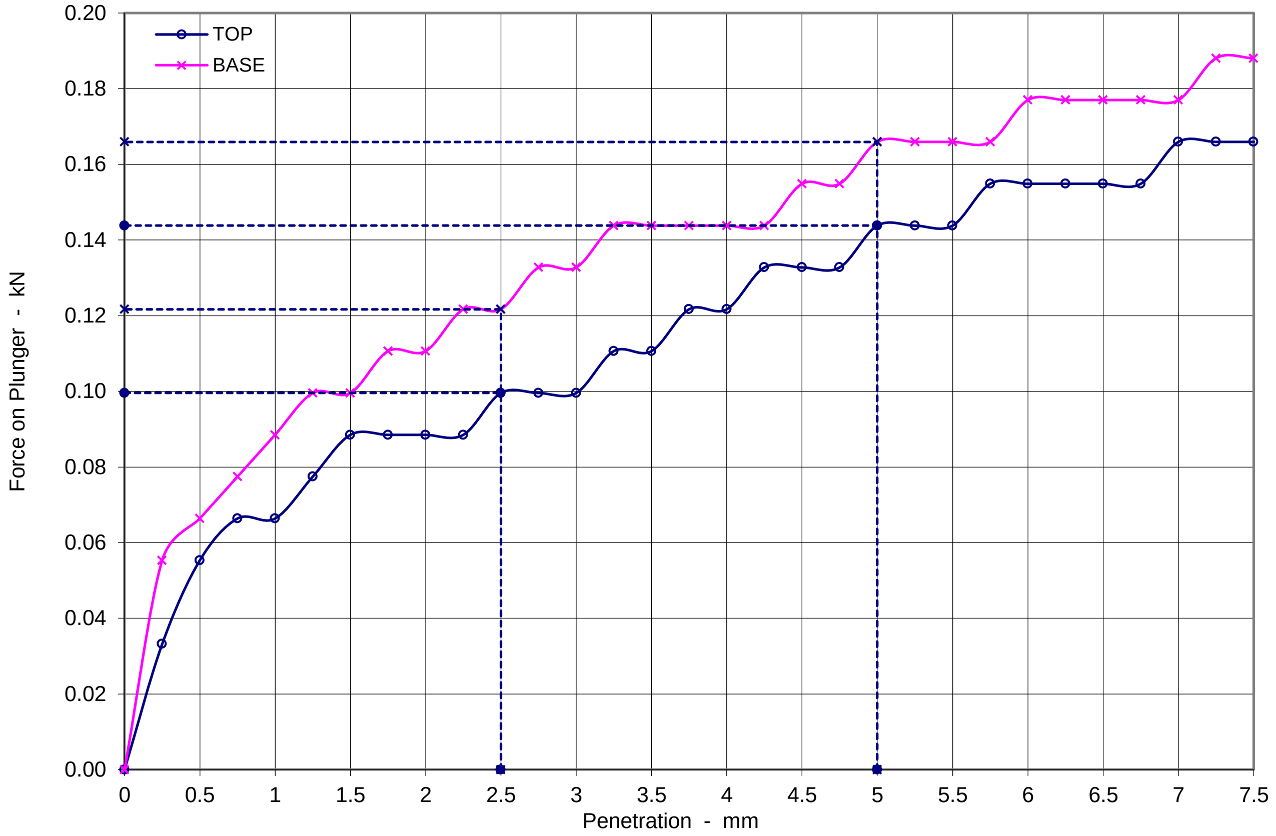
Figure

CBR

Printed: 14/08/2018 14:21

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-18-20180413014738	Hole No	TT1
		Sample Depth (m)	0.50 - 0.70
		Sample Type and No	B4
		Specimen Ref	1



Soil description	Brown slightly gravelly CLAY with occasional chalk fragments.

Test Conditions		
Sample Retained on 20 mm sieve	%	2

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	27.0
Bulk Density	Mg/m³	2.40
Dry Density	Mg/m³	1.90
Moisture Content - TOP	%	25.0
Moisture Content - BASE	%	26.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.8	0.9
5	0.7	0.8
Accepted CBR %	**0.8**	**0.9**

QA Ref
SLR 2
Rev 2.7
Apr 15

Project No A8015-18

Project Name VPI IMMINGHAM

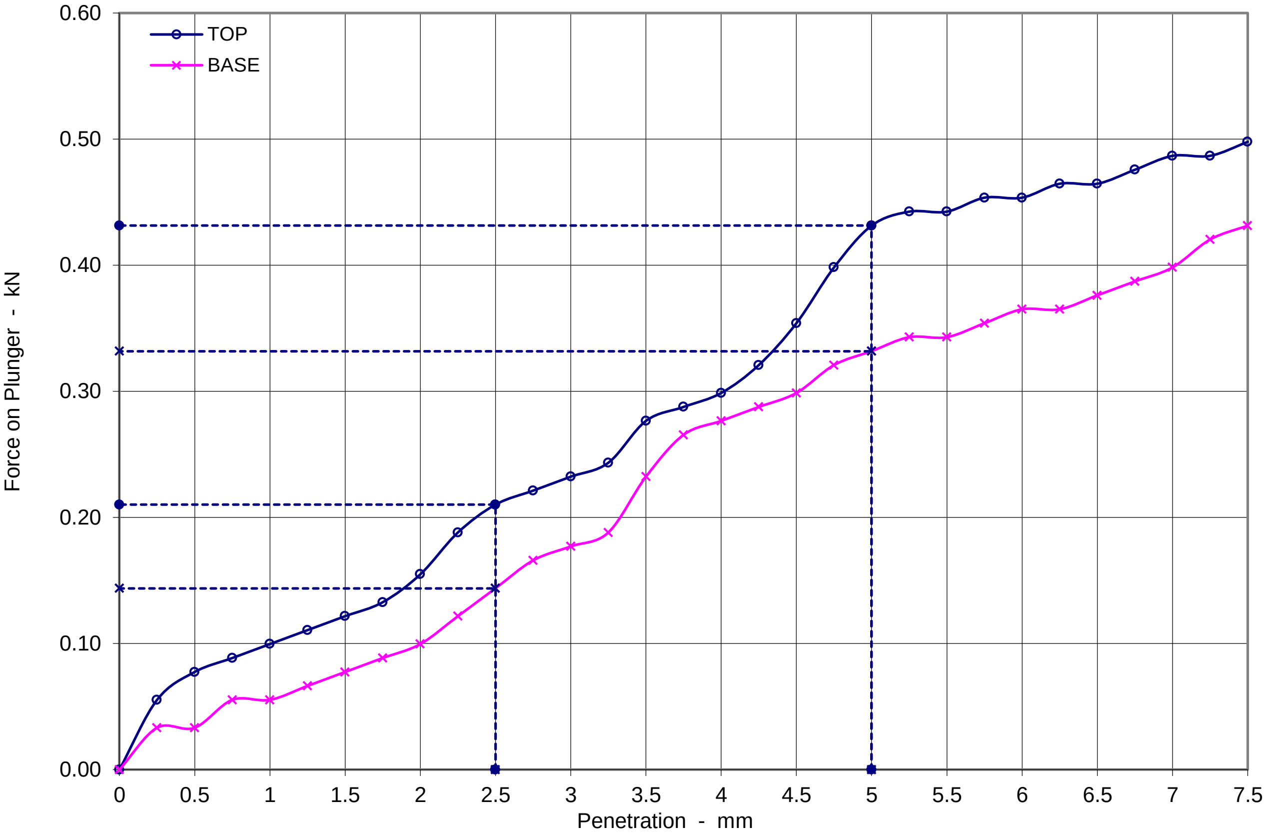
Figure

CBR

Printed: 14/08/2018 11:15

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID: A8015-18-20180408080446	Hole No	TT3
		Sample Depth (m)	0.30 - 0.60
		Sample Type and No	B2
		Specimen Ref	1



Soil description	Brown slightly sandy CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (2.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	16
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	25.0
Bulk Density	Mg/m³	1.94
Dry Density	Mg/m³	1.56
Moisture Content - TOP	%	24.0
Moisture Content - BASE	%	27.0

Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.6	1.1
5	2.2	1.7
Accepted CBR %	**2.2**	**1.7**

QA Ref
SLR 2
Rev 2.7
Apr 15

SOCOTEC

Project No	A8015-18
Project Name	VPI IMMINGHAM

Figure

CBR

Test carried out outside the scope of UKAS accreditation. © Copyright 2015 SOCOTEC UK Limited

Printed: 14/08/2018 11:15

TEST REPORT

Report No. EFS/187041 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 4 samples described in this report were registered for analysis by SOCOTEC UK Limited on 23-Jun-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 03-Jul-2018

The following tables are contained in this report:

On behalf of
SOCOTEC UK Lim Barnes
Tim Barnes Operations Director
Energy & Waste Services

Date of Issue: 03-Jul-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

		Units :	%
		Method Codes :	ORGMAT
		Method Reporting Limits :	0.1
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Organic Matter %**
1910777	BH4 D 2 1.20		1.4
1910778	TP02 D 3 0.30		7.1
1910779	BH5 D 13 2.90		1.4
1910780	BH2 D 3 0.60		16.7

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Client Name	**SOCOTEC UK Doncaster**
Contact	Tim Clifford

Sample Analysis

A8015-18 VPI Immingham

Date Printed	**03-Jul-2018**
Report Number	**EFS/187041**
Table Number	**1**

Where individual results are flagged see report notes for status.

Sample Analysis

SOCOTEC UK Ltd Environmental Chemistry
Analytical and Deviating Sample Overview

S187041

Customer **SOCOTEC UK Doncaster**
Site **A8015-18 VPI Immingham**
Report No **S187041**

Consignment No S75653
Date Logged 23-Jun-2018
In-House Report Due 29-Jun-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

		MethodID	CustServ	ORGMAT
ID Number	**Description**	**Sampled**	**REPORT A**	**Organic Matter %**
CL/1910777	BH4 1.20-1.65	D	**D**	**D**
CL/1910778	TP02 0.30	D	**D**	**D**
CL/1910779	BH5 2.90-3.35	D	**D**	**D**
CL/1910780	BH2 0.60	D	**D**	**D**

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key	
🟩	Analysis Required
🟨	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile
CR Denotes Crocidolite
AM Denotes Amosite
TR Denotes Tremolite
AC Denotes Actinolite
AN Denotes Anthophylite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.
This may have resulted in deterioration of the sample(s) during transit to the laboratory.
Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined
N.Det Not detected
N.F No Flow
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client :	SOCOTEC UK Doncaster
Site :	A8015-18 VPI Immingham
Report Number :	S18_7041

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1910777	BH4 D 2 1.20	CLAY
CL/1910778	TP02 D 3 0.30	SILT
CL/1910779	BH5 D 13 2.90	CLAY
CL/1910780	BH2 D 3 0.60	SILT

TEST REPORT

1252

Report No. EFS/187043 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 12 samples described in this report were registered for analysis by SOCOTEC UK Limited on 23-Jun-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 04-Jul-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

On behalf of
SOCOTEC UK Lim Barnes
Tim Barnes Operations Director
Energy & Waste Services

Date of Issue: 04-Jul-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

			SO4-- (acid sol)	SO4-- (H2O sol) mg/l	Organic Matter %	Total Sulphur.	pH (BS1377)
		Units :	mg/kg	mg/l	%	%	pH Units
		Method Codes :	ICPACIDS	ICPWSS	ORGMAT	TSBRE1	WSLM50
		Method Reporting Limits :	20	10	0.1	0.005	
		UKAS Accredited :	Yes	Yes	No	No	No
LAB ID Number CL/	**Client Sample Description**	**Sample Date**					
1910790	BH2 D 14 2.80				1.6		
1910791	BH3 D 4 2.00				1.4		
1910792	BH3 D 6 3.00		433	116		0.041	8.4
1910793	BH6 D 26 13.70		200	23		0.029	8.7
1910794	TP1 D 1 0.10				3.6		
1910795	TP2 D 11 4.00		276	56		0.031	8.8
1910796	TP3 D 9 3.40				1.5		
1910797	TP5 D 1 0.10				3.6		
1910798	TP6 D 3 0.40		1420	479		0.085	7.8
1910799	TP8 D 7 2.00				1.9		
1910800	TP9 D 5 0.80				3.1		
1910801	TT2 B 6 2.00		643	118		0.039	7.5

SOCOTEC

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Client Name **SOCOTEC UK Doncaster**

Contact Tim Clifford

Sample Analysis

A8015-18 VPI Immingham

Date Printed	**04-Jul-2018**
Report Number	**EFS/187043**
Table Number	**1**

Where individual results are flagged see report notes for status.

SOCOTEC UK Ltd Environmental Chemistry
Analytical and Deviating Sample Overview

Customer **SOCOTEC UK Doncaster**
Site **A8015-18 VPI Immingham**
Report No **S187043**

Consignment No S75655
Date Logged 23-Jun-2018
In-House Report Due 29-Jun-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

		MethodID	CustServ	Dep.Opt			ICPACIDS	ICPBRE	ICPWSS	KONECL	KoneNO3	ORGMAT	TSBRE1	WSLM50
ID Number	**Description**	**Sampled**	**REPORT A**	**DO Cl if pH<5.5**	**DO Mg if SO4(W)>3000**	**DO NO3 if pH<5.5**	**SO4-- (acid sol)**	**Magnesium (BRE)**	**SO4-- (H2O sol) mg/l**	**Chloride:(2:1)**	**Nitrate (BRE 2:1): mg/l**	**Organic Matter %**	**Total Sulphur.**	**pH (BS1377)**
							✓		✓					
CL/1910790	BH2 2.80-3.25	D	D									D		
CL/1910791	BH3 2.00-2.45	D	D									D		
CL/1910792	BH3 3.00-3.45	D	D	D	D	D	D	D	D	D	D		D	D
CL/1910793	BH6 13.70	D	D				D	D	D	D	D		D	D
CL/1910794	TP1 0.10	D	D									D		
CL/1910795	TP2 4.00	D	D				D	D	D	D	D		D	D
CL/1910796	TP3 3.40	D	D									D		
CL/1910797	TP5 0.10	D	D									D		
CL/1910798	TP6 0.40	D	D				D	D	D	D	D		D	D
CL/1910799	TP8 2.00	D	D									D		
CL/1910800	TP9 0.80	D	D									D		
CL/1910801	TT2 2.00-2.15	D	D				D	D	D	D	D		D	D

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key	
🟩	Analysis Required
🟨	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
⬜	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ICPACIDS	Oven Dried @ < 35°C	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract
Soil	TSBRE1	Oven Dried @ < 35°C	Determination of Total Carbon and/or Total Sulphur in solid samples by high temperature combustion/infrared detection
Soil	WSLM50	Oven Dried @ < 35°C	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile	**TR** Denotes Tremolite
CR Denotes Crocidolite	**AC** Denotes Actinolite
AM Denotes Amosite	**AN** Denotes Anthophylite

NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.
This may have resulted in deterioration of the sample(s) during transit to the laboratory.
Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined   **N.Det** Not detected
N.F No Flow
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : SOCOTEC UK Doncaster
Site : A8015-18 VPI Immingham
Report Number : S18_7043

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1910790	BH2 D 14 2.80	CLAY
CL/1910791	BH3 D 4 2.00	CLAY
CL/1910792	BH3 D 6 3.00	CLAY
CL/1910793	BH6 D 26 13.70	CLAY
CL/1910794	TP1 D 1 0.10	SILT
CL/1910795	TP2 D 11 4.00	SAND
CL/1910796	TP3 D 9 3.40	SILT
CL/1910797	TP5 D 1 0.10	CLAY
CL/1910798	TP6 D 3 0.40	SILT
CL/1910799	TP8 D 7 2.00	CLAY
CL/1910800	TP9 D 5 0.80	SILT
CL/1910801	TT2 B 6 2.00	SILT

TEST REPORT

1252

Report No. EFS/187204 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 11 samples described in this report were registered for analysis by SOCOTEC UK Limited on 28-Jun-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 09-Jul-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

On behalf of
SOCOTEC UK Lim Barnes
Tim Barnes Operations Director
Energy & Waste Services

Date of Issue: 09-Jul-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

LAB ID Number CL/	Client Sample Description	Sample Date	SO4-- (acid sol)	SO4-- (H2O sol) mg/l	Organic Matter %	Total Sulphur.	pH (BS1377)
Units :			mg/kg	mg/l	%	%	pH Units
Method Codes :			ICPACIDS	ICPWSS	ORGMAT	TSBRE1	WSLM50
Method Reporting Limits :			20	10	0.1	0.005	
UKAS Accredited :			Yes	Yes	No	No	No
1911581	TT02 B 6 2.00		498	79		0.033	7.8
1911582	TT03 B 4 1.30				2.6		
1911583	BH5 B 18 4.00		737	205		0.153	8.0
1911584	BH6 B 1 0.00				3.2		
1911585	TP02 B 10 3.40				1.6		
1911586	TP6 B 6 1.00				1.4		
1911587	TP09 B 6 0.80		626	121		0.053	7.6
1911588	BH1 D 3 0.45				13.7		
1911589	BH1 B 5 1.00		1260	847		0.068	7.8
1911590	BH2 B 13 2.20		1170	530		0.075	8.1
1911591	BH2 B 31 5.70		604	178		0.319	8.5

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Client Name **SOCOTEC UK Doncaster**

Contact Tim Clifford

A8015-18 VPI Immingham

Sample Analysis

Date Printed	**09-Jul-2018**
Report Number	**EFS/187204**
Table Number	**1**

Where individual results are flagged see report notes for status.

SOCOTEC UK Ltd Environmental Chemistry
Analytical and Deviating Sample Overview

Customer **SOCOTEC UK Doncaster**
Site **A8015-18 VPI Immingham**
Report No **S187204**

Consignment No S75795
Date Logged 28-Jun-2018
In-House Report Due 04-Jul-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	CustServ	Dep.Opt			ICPACIDS	ICPBRE	ICPWSS	KONECL	KoneNO3	ORGMAT	TSBRE1	WSLM50
		Sampled	REPORT A	DO Cl if pH<5.5	DO Mg if SO4(W)>3000	DO NO3 if pH<5.5	SO4-- (acid sol)	Magnesium (BRE)	SO4-- (H2O sol) mg/l	Chloride:(2:1)	Nitrate (BRE 2:1): mg/l	Organic Matter %	Total Sulphur.	pH (BS1377)
							✓		✓					
CL/1911581	TT02 2.00-2.15	D	D	D	D	D	D	D	D	D	D		D	D
CL/1911582	TT03 1.30-1.60	D	D									D		
CL/1911583	BH5 4.00-4.45	D	D				D	D	D	D	D		D	D
CL/1911584	BH6 0.00-0.30	D	D									D		
CL/1911585	TP02 3.40-3.50	D	D									D		
CL/1911586	TP6 1.00-1.20	D	D									D		
CL/1911587	TP09 0.80-1.00	D	D				D	D	D	D	D		D	D
CL/1911588	BH1 0.45	D	D									D		
CL/1911589	BH1 1.00-1.20	D	D				D	D	D	D	D		D	D
CL/1911590	BH2 2.20-2.70	D	D				D	D	D	D	D		D	D
CL/1911591	BH2 5.70-6.15	D	D				D	D	D	D	D		D	D

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key	
🟩	Analysis Required
🟨	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
☐	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	**MethodID**	**Analysis Basis**	**Method Description**
Soil	ICPACIDS	Oven Dried @ < 35°C	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract
Soil	TSBRE1	Oven Dried @ < 35°C	Determination of Total Carbon and/or Total Sulphur in solid samples by high temperature combustion/infrared detection
Soil	WSLM50	Oven Dried @ < 35°C	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis
Unless stated otherwise results are expressed as mg/l
Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile
CR Denotes Crocidolite
AM Denotes Amosite
TR Denotes Tremolite
AC Denotes Actinolite
AN Denotes Anthophylite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.
This may have resulted in deterioration of the sample(s) during transit to the laboratory.
Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined
N.Det Not detected
N.F No Flow
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : SOCOTEC UK Doncaster
Site : A8015-18 VPI Immingham
Report Number : S18_7204

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1911581	TT02 B 6 2.00	SILT
CL/1911582	TT03 B 4 1.30	SILT
CL/1911583	BH5 B 18 4.00	CLAY
CL/1911584	BH6 B 1 0.00	GRAVEL
CL/1911585	TP02 B 10 3.40	CLAY
CL/1911586	TP6 B 6 1.00	CLAY
CL/1911587	TP09 B 6 0.80	CLAY
CL/1911588	BH1 D 3 0.45	SILT
CL/1911589	BH1 B 5 1.00	CLAY
CL/1911590	BH2 B 13 2.20	CLAY
CL/1911591	BH2 B 31 5.70	CLAY

TEST REPORT

Report No. EFS/187902 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 1 sample described in this report were registered for analysis by SOCOTEC UK Limited on 19-Jul-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 25-Jul-2018

The following tables are contained in this report:

On behalf of
SOCOTEC UK Lim
T Barnes
Tim Barnes Operations Director
Energy & Waste Services

Date of Issue: 25-Jul-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Units :			%
Method Codes :			ORGMAT
Method Reporting Limits :			0.1
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Organic Matter %**
1914695	BH1 D 7 1.65		1.1

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name	**SOCOTEC UK Doncaster**
Contact	Tim Clifford

A8015-18 VPI Immingham

Sample Analysis

Date Printed	**25-Jul-2018**
Report Number	**EFS/187902**
Table Number	**1**

Where individual results are flagged see report notes for status.

Sample Analysis

SOCOTEC UK Ltd Environmental Chemistry
Analytical and Deviating Sample Overview

S187902

Customer **SOCOTEC UK Doncaster**
Site **A8015-18 VPI Immingham**
Report No **S187902**

Consignment No S75653
Date Logged 19-Jul-2018
In-House Report Due 25-Jul-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

		MethodID	CustServ	ORGMAT
ID Number	**Description**	**Sampled**	**REPORT A**	**Organic Matter %**
CL/1914695	BH1 1.65-1.80	D	**D**	**D**

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key	
🟩	Analysis Required
🟨	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis
Unless stated otherwise results are expressed as mg/l
Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile	**TR** Denotes Tremolite
CR Denotes Crocidolite	**AC** Denotes Actinolite
AM Denotes Amosite	**AN** Denotes Anthophylite

NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.
This may have resulted in deterioration of the sample(s) during transit to the laboratory.
Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined **N.Det** Not detected
N.F No Flow
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : SOCOTEC UK Doncaster
Site : A8015-18 VPI Immingham
Report Number : S18_7902

Note: major constituent in upper case

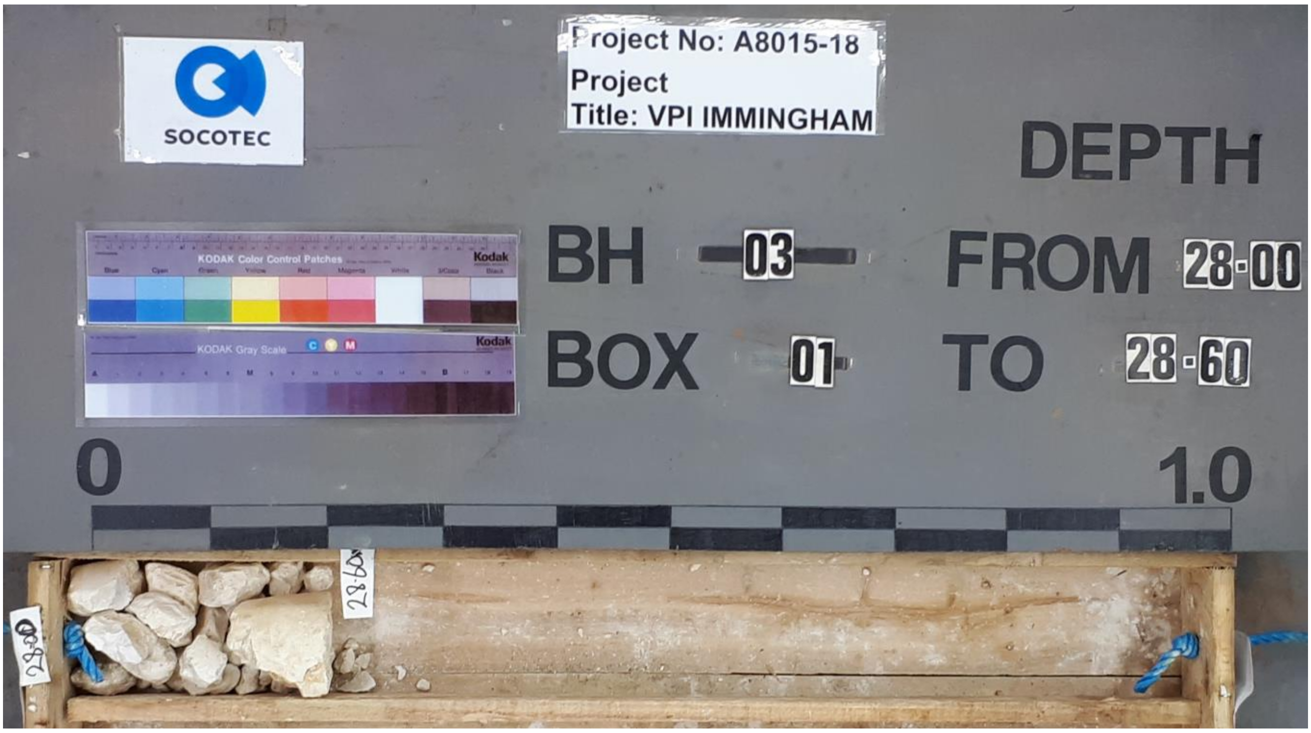
Lab ID Number	Client ID	Description
CL/1914695	BH1 D 7 1.65	Brown Stone CLAY

APPENDIX E

PHOTOGRAPHS

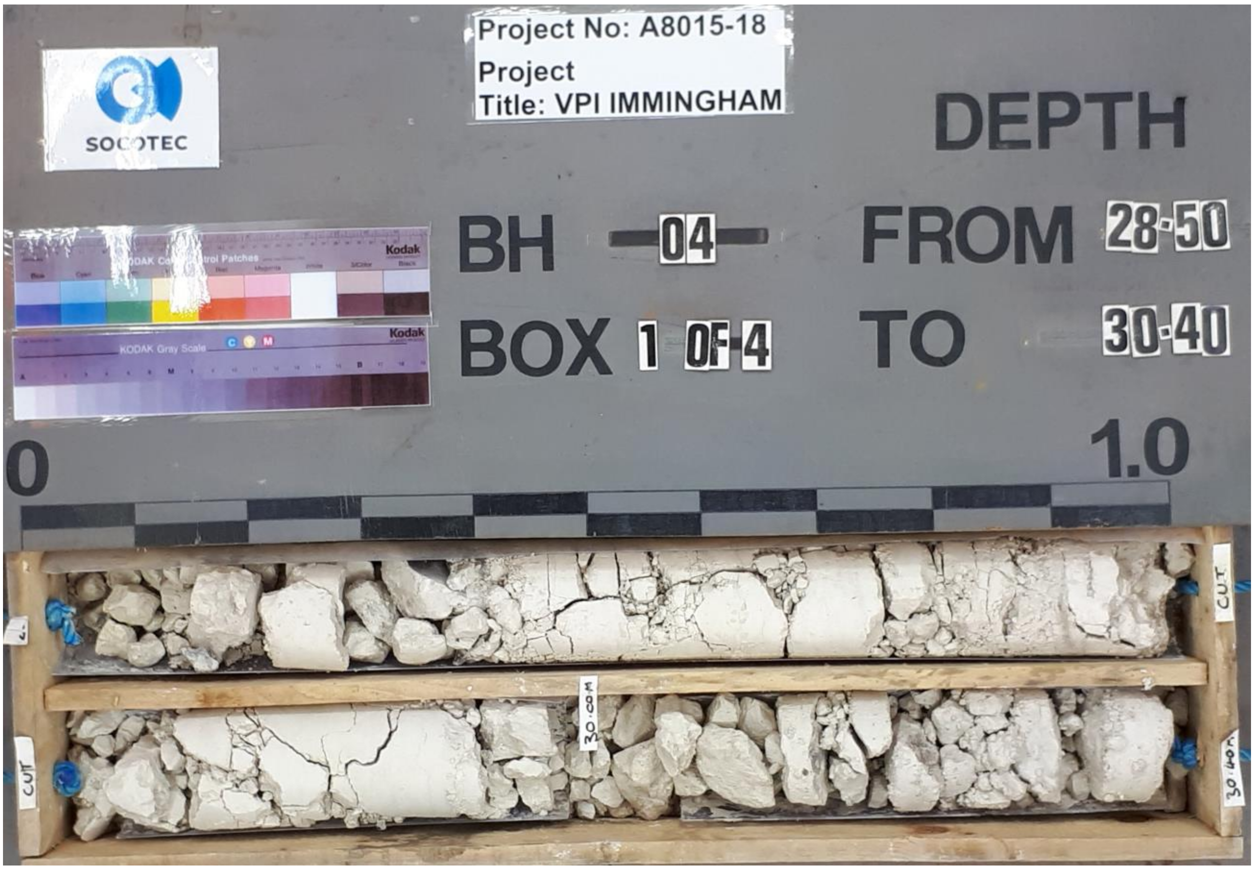
Rotary Cores	Plate 1 to 6
Trial Pits	Plate 7 to 21

Photographs



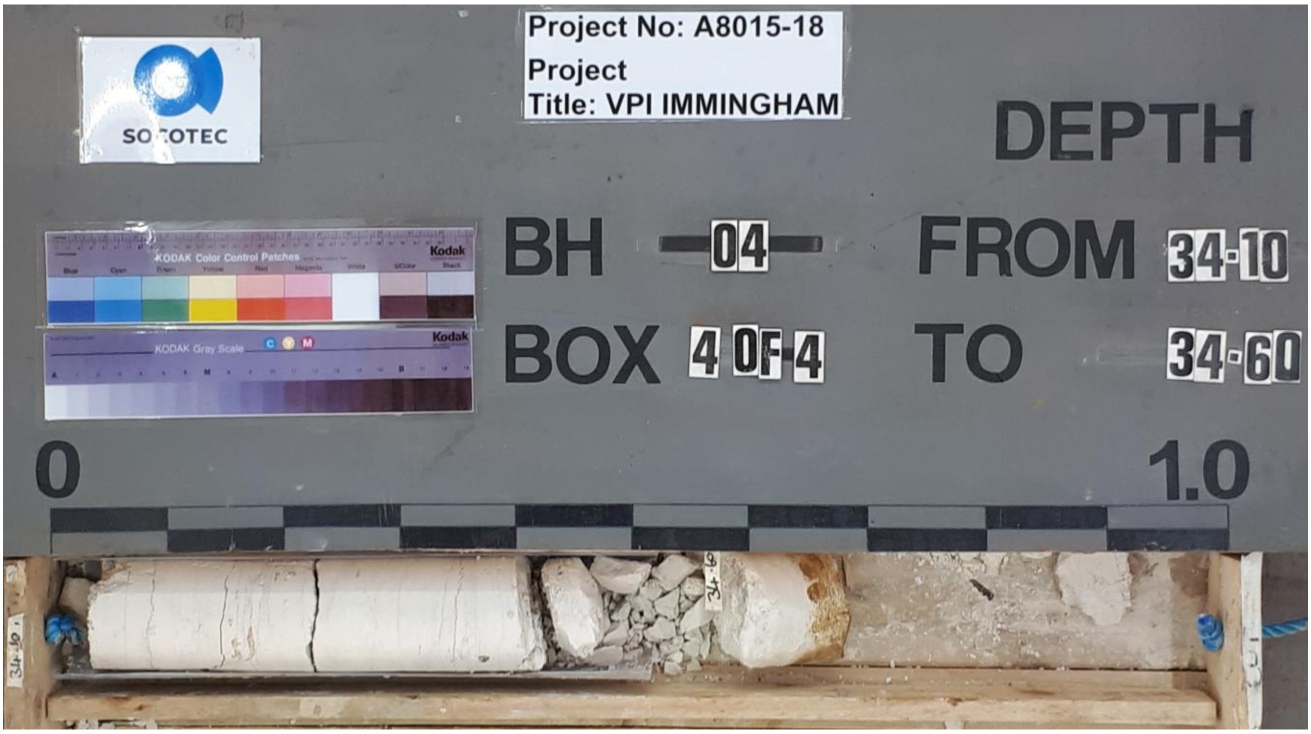
Notes:	**Project** **Project No.** **Carried out for**	**VPI IMMINGHAM** **A8015-18** **AECOM**	**Plate** **1**

Photographs



Notes:	Project	VPI IMMINGHAM	Plate
	Project No.	A8015-18	2
	Carried out for	AECOM	

Photographs



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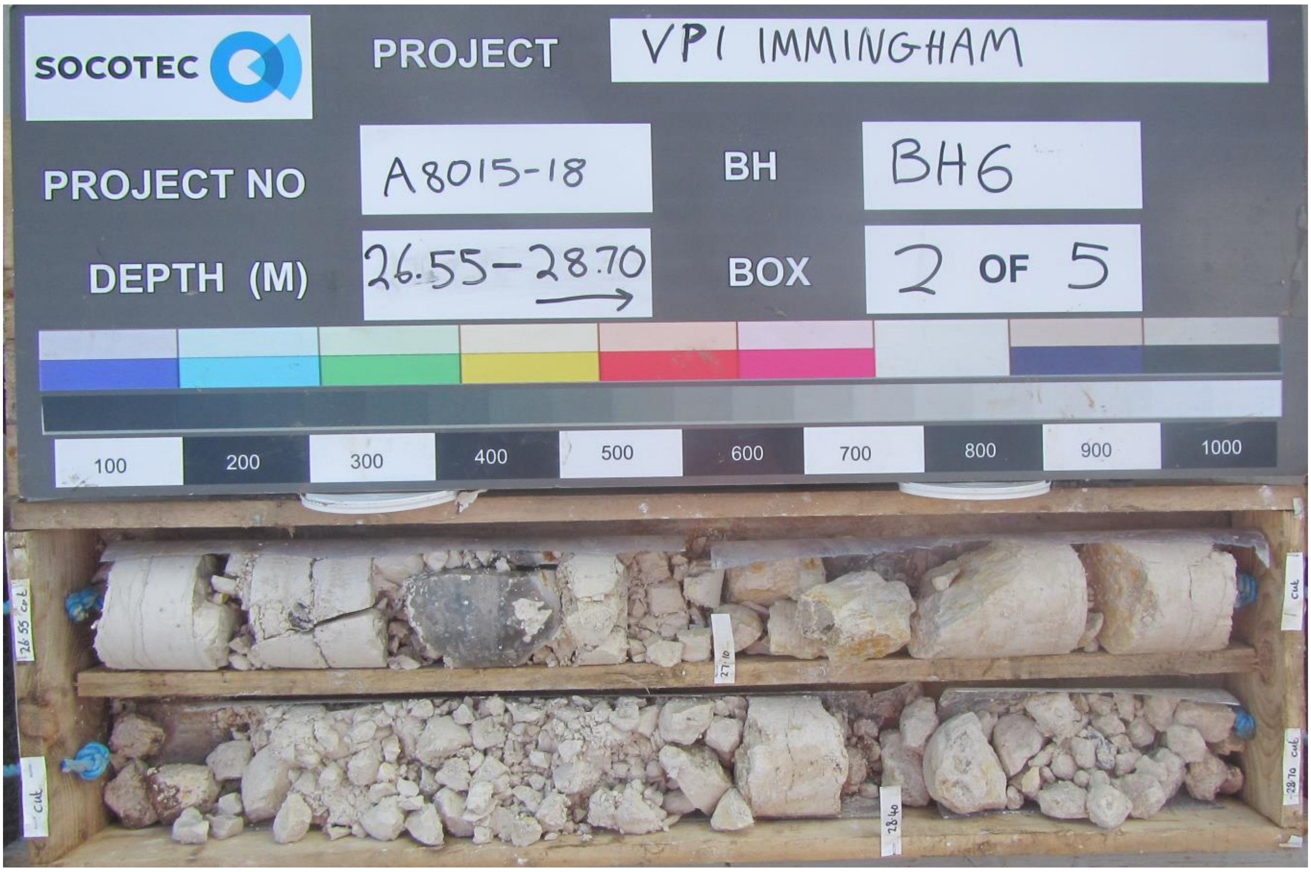
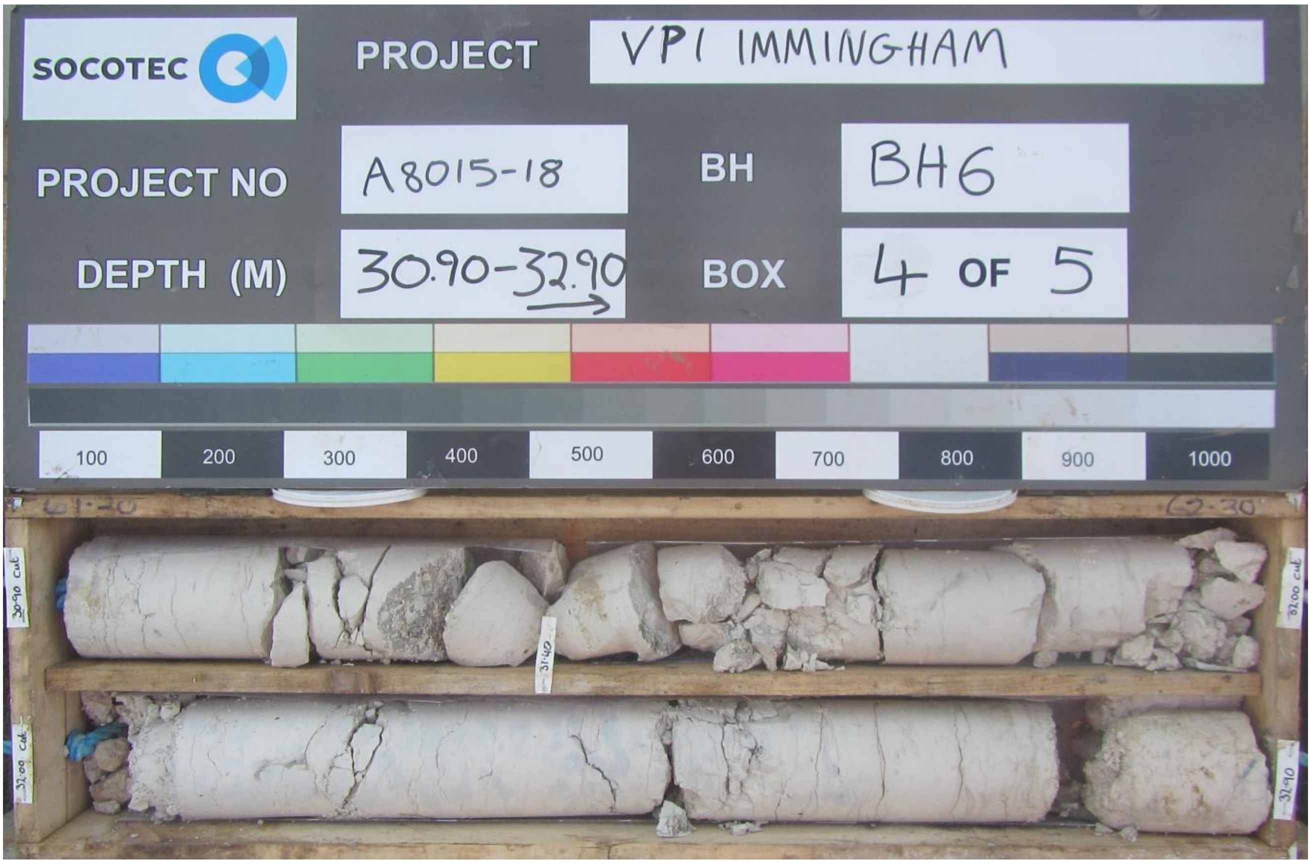
	Project No.	A8015-18	3
	Carried out for	AECOM	

Photographs



Notes:	Project	VPI IMMINGHAM	Plate
	Project No.	A8015-18	4
	Carried out for	AECOM	

Photographs



Notes:	Project	VPI IMMINGHAM	Plate
	Project No.	A8015-18	5
	Carried out for	AECOM	

Photographs

Notes:	Project	VPI IMMINGHAM	Plate
	Project No.	A8015-18	6
	Carried out for	AECOM	

Photographs

TP1

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**7**
	Carried out for	**AECOM**	

Photographs

TP1 Spoil

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**8**
	Carried out for	**AECOM**	

Photographs

TP2

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**	**9**
	Project No.	**A8015-18**		
	Carried out for	**AECOM**		

Photographs

TP2 Spoil

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**10**
	Carried out for	**AECOM**	

Photographs

TP3

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**11**
	Carried out for	**AECOM**	

Photographs

TP3 Spoil

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**12**
	Carried out for	**AECOM**	

Photographs

TP5

Notes:

Project	**VPI IMMINGHAM**	**Plate**	**13**
Project No.	**A8015-18**		
Carried out for	**AECOM**		

Photographs

TP6

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**14**
	Carried out for	**AECOM**	

Photographs

TP6 Spoil

Notes:

Project	**VPI IMMINGHAM**	**Plate**	**15**
Project No.	**A8015-18**		
Carried out for	**AECOM**		

Photographs

TP9 Spoil

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**16**
	Carried out for	**AECOM**	

Photographs

TP10

Notes:

Project	**VPI IMMINGHAM**	**Plate**
Project No.	**A8015-18**	**17**
Carried out for	**AECOM**	

Photographs

TP10 Spoil

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**18**
	Carried out for	**AECOM**	

Photographs

TT02

Notes:	**Project**	**VPI IMMINGHAM**	**Plate**
	Project No.	**A8015-18**	**19**
	Carried out for	**AECOM**	

Photographs

TT02 Spoil

Notes:

Project VPI IMMINGHAM

Project No. A8015-18

Carried out for AECOM

Plate 20

Photographs

TT03

Notes:	Project	VPI IMMINGHAM	Plate
	Project No.	A8015-18	21
	Carried out for	AECOM	

Appendix D Laboratory Certifications

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

AECOM
2 City Walk
Leeds
LS11 9AR

Attention :	Alex Freeman
Date :	23rd August, 2018
Your reference :	60569745
Our reference :	Test Report 18/7222 Batch 1 18/5333 Batch 1 18/5166 Batch 1 18/5455 Batch 1 18/5
Location :	VP1 (TLOR)
Date samples received :	
Status :	Final report
Issue :	1

Compiled By:

Simon Gomery BSc
Project Manager

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5166	18/5166	18/5166	18/5166	18/5166	18/5166	18/5166	18/5333	18/5333	18/5333			
J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	1-3	4-6	7-9			
Sample ID	BH06	BH01	TT03	TT02	WS01	WS04	TP10	TT01	TP09	TP07			
Depth	0.40-0.70	0.45-0.70	0.00-1.40	0.50-1.20	1.00-1.25	0.50	0.40-0.60	1.70-1.90	0.30-0.40	1.30-1.60			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	05/04/2018	05/04/2018	06/04/2018	06/04/2018	06/04/2018	06/04/2018	06/04/2018	09/04/2018	09/04/2018	09/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	11/04/2018	11/04/2018	11/04/2018			
Arsenic $^{\#M}$	10.7	NDP	9.8	10.8	NDP	8.9	10.7	9.0	6.8	9.4	<0.5	mg/kg	TM30/PM15
Barium $^{\#M}$	163	NDP	98	144	NDP	169	112	112	65	127	<1	mg/kg	TM30/PM15
Beryllium	4.2	NDP	1.0	1.5	NDP	1.3	1.3	1.4	0.7	1.3	<0.5	mg/kg	TM30/PM15
Cadmium $^{\#M}$	<0.1	NDP	0.1	0.2	NDP	<0.1	0.2	0.2	0.3	0.2	<0.1	mg/kg	TM30/PM15
Chromium $^{\#M}$	81.5	NDP	106.0	75.9	NDP	85.2	87.6	52.6	44.9	69.0	<0.5	mg/kg	TM30/PM15
Copper $^{\#M}$	13	NDP	13	21	NDP	15	21	16	11	9	<1	mg/kg	TM30/PM15
Lead $^{\#M}$	15	NDP	19	20	NDP	16	26	13	11	15	<5	mg/kg	TM30/PM15
Mercury $^{\#M}$	<0.1	NDP	<0.1	<0.1	NDP	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Nickel $^{\#M}$	19.7	NDP	23.0	30.9	NDP	30.1	26.4	32.4	19.0	28.6	<0.7	mg/kg	TM30/PM15
Selenium $^{\#M}$	2	NDP	1	<1	NDP	2	<1	2	2	2	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 $^{\#M}$	-	NDP	-	-	NDP	-	-	-	-	-	<50	mg/kg	TM50/PM29
Vanadium	79	NDP	56	62	NDP	54	56	46	30	46	<1	mg/kg	TM30/PM15
Water Soluble Boron $^{\#M}$	2.5	NDP	1.2	1.7	NDP	2.1	1.5	1.7	0.9	1.0	<0.1	mg/kg	TM74/PM32
Zinc $^{\#M}$	53	NDP	57	71	NDP	67	106	61	73	62	<5	mg/kg	TM30/PM15
Arsenic	-	21.0	-	-	16.3	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Barium	-	504	-	-	310	-	-	-	-	-	<1	mg/kg	TM30/PM62
Beryllium	-	2.1	-	-	1.9	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium	-	3.1	-	-	1.6	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium	-	79.8	-	-	68.7	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper	-	148	-	-	113	-	-	-	-	-	<1	mg/kg	TM30/PM62
Lead	-	124	-	-	73	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury	-	1.7	-	-	<0.1	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel	-	163.1	-	-	92.4	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium	-	10	-	-	4	-	-	-	-	-	<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	8841	-	-	10971	-	-	-	-	-	<50	mg/kg	TM50/PM29
Vanadium	-	338	-	-	231	-	-	-	-	-	<1	mg/kg	TM30/PM62
Water Soluble Boron	-	2.9	-	-	2.6	-	-	-	-	-	<0.1	mg/kg	TM74/PM61
Zinc	-	1275	-	-	663	-	-	-	-	-	<5	mg/kg	TM30/PM62
VOC TICs	-	See Attached	-	-	ND	-	-	-	-	-		None	TM15/PM10
Methyl Tertiary Butyl Ether $^{\#M}$	-	<6	-	-	<6	-	-	-	-	-	<6	ug/kg	TM15/PM10
Benzene $^{\#M}$	-	46	-	-	47	-	-	-	-	-	<5	ug/kg	TM15/PM10
Toluene $^{\#M}$	-	7	-	-	15	-	-	-	-	-	<3	ug/kg	TM15/PM10
Ethylbenzene $^{\#M}$	-	60	-	-	31	-	-	-	-	-	<3	ug/kg	TM15/PM10
p/m-Xylene $^{\#M}$	-	114	-	-	89	-	-	-	-	-	<4	ug/kg	TM15/PM10
o-Xylene $^{\#M}$	-	36	-	-	31	-	-	-	-	-	<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	57	-	-	57	-	-	-	-	-	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	59	-	-	55	-	-	-	-	-	<0	%	TM15/PM10
SVOC TICs	-	See Attached$_{AB}$	-	-	See Attached$_{AB}$	-	-	-	-	-		None	TM16/PM8

Exova Jones Environmental

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5166	18/5166	18/5166	18/5166	18/5166	18/5166	18/5166	18/5333	18/5333	18/5333			
J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	1-3	4-6	7-9			
Sample ID	BH06	BH01	TT03	TT02	WS01	WS04	TP10	TT01	TP09	TP07			
Depth	0.40-0.70	0.45-0.70	0.00-1.40	0.50-1.20	1.00-1.25	0.50	0.40-0.60	1.70-1.90	0.30-0.40	1.30-1.60			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	05/04/2018	05/04/2018	06/04/2018	06/04/2018	06/04/2018	06/04/2018	06/04/2018	09/04/2018	09/04/2018	09/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	11/04/2018	11/04/2018	11/04/2018			
TPH CWG													
Aliphatics													
>C5-C6 $^{\#M}$	-	<0.1^{SV}	-	-	<0.1^{SV}	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
>C6-C8 $^{\#M}$	-	<0.1^{SV}	-	-	0.2^{SV}	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
>C8-C10	-	1.0^{SV}	-	-	1.1^{SV}	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
>C10-C12 $^{\#M}$	-	588.8	-	-	51.8	-	-	-	-	-	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 $^{\#M}$	-	1627	-	-	343	-	-	-	-	-	<4	mg/kg	TM5/PM8/PM16
>C16-C21 $^{\#M}$	-	2885	-	-	977	-	-	-	-	-	<7	mg/kg	TM5/PM8/PM16
>C21-C35 $^{\#M}$	-	5172	-	-	2523	-	-	-	-	-	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	-	10274	-	-	3896	-	-	-	-	-	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 $^{\#}$	-	<0.1^{SV}	-	-	<0.1^{SV}	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8 $^{\#}$	-	<0.1^{SV}	-	-	<0.1^{SV}	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 $^{\#M}$	-	<0.1^{SV}	-	-	<0.1^{SV}	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12 $^{\#}$	-	92.9	-	-	10.3	-	-	-	-	-	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 $^{\#}$	-	809	-	-	104	-	-	-	-	-	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 $^{\#}$	-	3404	-	-	629	-	-	-	-	-	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 $^{\#}$	-	8205	-	-	3203	-	-	-	-	-	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 $^{\#}$	-	12511	-	-	3946	-	-	-	-	-	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	22785	-	-	7842	-	-	-	-	-	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Natural Moisture Content	20.9	NDP	15.5	20.5	NDP	17.5	17.1	21.1	11.9	13.7	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	-	-	-	-	-	-	-	-	-	-	<0.6	mg/kg	TM38/PM20
Ammoniacal Nitrogen as NH4	0.8	39.3	<0.6	<0.6	30.5	<0.6	1.5	<0.6	<0.6	<0.6	<0.6	mg/kg	TM38/PM20
Chloride $^{\#M}$	-	NDP	-	-	NDP	-	-	-	-	-	<2	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE)	-	-	-	-	-	-	-	-	-	-	<0.002	g/l	TM38/PM60
Chloride	-	39	-	-	89	-	-	-	-	-	<2	mg/kg	TM38/PM60
Fluoride	-	4.5	-	-	3.7	-	-	-	-	-	<0.3	mg/kg	TM173/PM20
Hexavalent Chromium $^{\#}$	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Nitrate as N	-	-	-	-	-	-	-	-	-	-	<2.5	mg/kg	TM38/PM20
Nitrate as NO3	-	NDP	-	-	NDP	-	-	-	-	-	<2.5	mg/kg	TM38/PM20
Nitrate as NO3	-	<2.5	-	-	<2.5	-	-	-	-	-	<2.5	mg/kg	TM38/PM60
Nitrate as N	-	-	-	-	-	-	-	-	-	-	<2.5	mg/kg	TM38/PM60
Sulphate as SO4 (2:1 Ext) $^{\#M}$	-	-	-	-	-	-	-	-	-	-	<0.0015	g/l	TM38/PM20
Chromium III	81.5	NDP	106.0	75.9	NDP	85.2	87.6	52.6	44.9	69.0	<0.5	mg/kg	NONE/NONE
Chromium III	-	79.8	-	-	68.7	-	-	-	-	-	<0.5	mg/kg	NONE/NONE
Organic Matter	1.2	NDP	1.5	2.1	NDP	1.0	2.0	0.7	0.7	0.8	<0.2	%	TM21/PM24
Sulphide	-	53	-	-	25	-	-	-	-	-	<10	mg/kg	TM107/PM119
pH $^{\#M}$	8.07	7.31	7.69	7.78	7.29	8.50	7.26	7.97	8.46	8.25	<0.01	pH units	TM73/PM11
Sample Type	Clay	NDP	Clay	Clay	NDP	Clay	Clay	Clay	Clay	Clay		None	PM13/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	AECOM	**Report :**	**Solid**
Reference:	60569745		
Location:	VP1 (TLOR)	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Alex Freeman		

J E Job No.	18/5166	18/5166	18/5166	18/5166	18/5166	18/5166	18/5166	18/5333	18/5333	18/5333			
J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	1-3	4-6	7-9			
Sample ID	BH06	BH01	TT03	TT02	WS01	WS04	TP10	TT01	TP09	TP07			
Depth	0.40-0.70	0.45-0.70	0.00-1.40	0.50-1.20	1.00-1.25	0.50	0.40-0.60	1.70-1.90	0.30-0.40	1.30-1.60	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B	V J B			
Sample Date	05/04/2018	05/04/2018	06/04/2018	06/04/2018	06/04/2018	06/04/2018	06/04/2018	09/04/2018	09/04/2018	09/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	11/04/2018	11/04/2018	11/04/2018			
Sample Colour	Medium Brown	NDP	Medium Brown	Medium Brown	NDP	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown		None	PM13/PM0
Other Items	stones	NDP	, sand	carbon, sand, vegetation	NDP	chalk	sand	chalk, carbon	vegetation, stones	sand, stone		None	PM13/PM0

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5333	18/5333	18/5333	18/5333	18/5333	18/5333	18/5384	18/5384	18/5384	18/5384			
J E Sample No.	13-15	16-18	19-21	22-24	25-27	28-29	1-3	7-9	13-15	19-21			
Sample ID	TP08	WS02	TP05	WS05	TP04	WS03	TP06	TP01	TP02	WS06			
Depth	0.20-0.50	0.00-0.50	0.50-0.70	0.50-1.00	0.80-1.00	0.00-1.20	0.40-0.60	0.70-0.90	0.30-0.50	0.00-1.20			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V B	V J B	V J B	V J B	V J B			
Sample Date	09/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	11/04/2018	11/04/2018	11/04/2018	11/04/2018	11/04/2018	11/04/2018	12/04/2018	12/04/2018	12/04/2018	12/04/2018			
Arsenic $^{\#M}$	7.2	11.4	9.0	10.5	7.4	7.3	NDP	NDP	NDP	6.4	<0.5	mg/kg	TM30/PM15
Barium $^{\#M}$	117	121	162	147	116	169	NDP	NDP	NDP	133	<1	mg/kg	TM30/PM15
Beryllium	1.4	1.3	1.3	1.5	1.1	1.5	NDP	NDP	NDP	1.4	<0.5	mg/kg	TM30/PM15
Cadmium $^{\#M}$	<0.1	0.3	0.2	0.4	0.2	0.2	NDP	NDP	NDP	0.2	<0.1	mg/kg	TM30/PM15
Chromium $^{\#M}$	81.4	60.0	60.4	71.5	64.0	65.2	NDP	NDP	NDP	50.1	<0.5	mg/kg	TM30/PM15
Copper $^{\#M}$	15	20	15	28	11	45	NDP	NDP	NDP	10	<1	mg/kg	TM30/PM15
Lead $^{\#M}$	15	22	11	34	9	42	NDP	NDP	NDP	10	<5	mg/kg	TM30/PM15
Mercury $^{\#M}$	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	NDP	NDP	NDP	<0.1	<0.1	mg/kg	TM30/PM15
Nickel $^{\#M}$	37.3	36.1	28.2	29.8	26.5	45.8	NDP	NDP	NDP	33.3	<0.7	mg/kg	TM30/PM15
Selenium $^{\#M}$	<1	1	2	2	2	<1	NDP	NDP	NDP	<1	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 $^{\#M}$	-	701	-	2252	-	6510	NDP	NDP	NDP	-	<50	mg/kg	TM50/PM29
Vanadium	52	67	45	69	39	87	NDP	NDP	NDP	45	<1	mg/kg	TM30/PM15
Water Soluble Boron $^{\#M}$	1.2	1.8	1.6	2.2	1.5	3.4	NDP	NDP	NDP	1.0	<0.1	mg/kg	TM74/PM32
Zinc $^{\#M}$	66	131	56	149	50	231	NDP	NDP	NDP	113	<5	mg/kg	TM30/PM15
Arsenic	-	-	-	-	-	-	10.3	26.3	21.6	-	<0.5	mg/kg	TM30/PM62
Barium	-	-	-	-	-	-	118	369	337	-	<1	mg/kg	TM30/PM62
Beryllium	-	-	-	-	-	-	1.3	1.9	1.8	-	<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	-	-	-	0.3	1.8	0.8	-	<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	-	-	-	36.0	75.1	63.4	-	<0.5	mg/kg	TM30/PM62
Copper	-	-	-	-	-	-	18	205	158	-	<1	mg/kg	TM30/PM62
Lead	-	-	-	-	-	-	28	103	71	-	<5	mg/kg	TM30/PM62
Mercury	-	-	-	-	-	-	<0.1	2.3	1.7	-	<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	-	-	-	29.7	121.9	81.6	-	<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	-	-	-	<1	4	4	-	<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	-	-	-	-	-	856	16251$_{AB}$	6783	-	<50	mg/kg	TM50/PM29
Vanadium	-	-	-	-	-	-	58	275	186	-	<1	mg/kg	TM30/PM62
Water Soluble Boron	-	-	-	-	-	-	4.4	3.4	3.6	-	<0.1	mg/kg	TM74/PM61
Zinc	-	-	-	-	-	-	84	947	623	-	<5	mg/kg	TM30/PM62
VOC TICs	-	ND	-	ND	-	ND	ND	See Attached	ND	-		None	TM15/PM10
Methyl Tertiary Butyl Ether $^{\#M}$	-	<6	-	<6	-	<6	<6	<6	<6	-	<6	ug/kg	TM15/PM10
Benzene $^{\#M}$	-	<5	-	<5	-	<5	<5	45	60	-	<5	ug/kg	TM15/PM10
Toluene $^{\#M}$	-	<3	-	<3	-	<3	<3	5	19	-	<3	ug/kg	TM15/PM10
Ethylbenzene $^{\#M}$	-	<3	-	<3	-	<3	<3	39	121	-	<3	ug/kg	TM15/PM10
p/m-Xylene $^{\#M}$	-	<4	-	<4	-	9	<4	213	115	-	<4	ug/kg	TM15/PM10
o-Xylene $^{\#M}$	-	<4	-	<4	-	<4	<4	49	54	-	<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	93	-	92	-	78	85	52	52	-	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	86	-	77	-	64	74	58	54	-	<0	%	TM15/PM10
SVOC TICs	-	ND	-	ND	-	ND	ND	See Attached	See Attached	-		None	TM16/PM8

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Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5333	18/5333	18/5333	18/5333	18/5333	18/5333	18/5384	18/5384	18/5384	18/5384			
J E Sample No.	13-15	16-18	19-21	22-24	25-27	28-29	1-3	7-9	13-15	19-21			
Sample ID	TP08	WS02	TP05	WS05	TP04	WS03	TP06	TP01	TP02	WS06			
Depth	0.20-0.50	0.00-0.50	0.50-0.70	0.50-1.00	0.80-1.00	0.00-1.20	0.40-0.60	0.70-0.90	0.30-0.50	0.00-1.20			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V B	V J B	V J B	V J B	V J B			
Sample Date	09/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	11/04/2018	11/04/2018	11/04/2018	11/04/2018	11/04/2018	11/04/2018	12/04/2018	12/04/2018	12/04/2018	12/04/2018			
TPH CWG													
Aliphatics													
>C5-C6 $^{\#M}$	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1^{SV}	<0.1^{SV}	-	<0.1	mg/kg	TM36/PM12
>C6-C8 $^{\#M}$	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1^{SV}	1.3^{SV}	-	<0.1	mg/kg	TM36/PM12
>C8-C10	-	<0.1	-	<0.1	-	<0.1	<0.1	0.3^{SV}	5.6^{SV}	-	<0.1	mg/kg	TM36/PM12
>C10-C12 $^{\#M}$	-	<0.2	-	4.9	-	9.7	<0.2	154.5	325.9	-	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 $^{\#M}$	-	9	-	52	-	101	<4	789	925	-	<4	mg/kg	TM5/PM8/PM16
>C16-C21 $^{\#M}$	-	26	-	256	-	367	<7	1715	1534	-	<7	mg/kg	TM5/PM8/PM16
>C21-C35 $^{\#M}$	-	82	-	675	-	876	<7	3414	3001	-	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	-	117	-	988	-	1354	<19	6073	5793	-	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 $^{\#}$	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1^{SV}	<0.1^{SV}	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8 $^{\#}$	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1^{SV}	<0.1^{SV}	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 $^{\#M}$	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1^{SV}	<0.1^{SV}	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12 $^{\#}$	-	<0.2	-	<0.2	-	<0.2	<0.2	33.9	103.8	-	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 $^{\#}$	-	<4	-	32	-	37	<4	358	688	-	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 $^{\#}$	-	17	-	322	-	357	<7	1663	1953	-	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 $^{\#}$	-	158	-	1581	-	1790	<7	5036	5372	-	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 $^{\#}$	-	175	-	1935	-	2184	<19	7091	8117	-	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	292	-	2923	-	3538	<38	13164	13910	-	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Natural Moisture Content	22.0	20.7	23.8	22.0	17.6	34.3	NDP	NDP	NDP	20.4	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	-	-	-	-	-	-	-	-	-	-	<0.6	mg/kg	TM38/PM20
Ammoniacal Nitrogen as NH4	<0.6	2.6	<0.6	14.2	<0.6	20.2	8.3	41.7	13.5	<0.6	<0.6	mg/kg	TM38/PM20
Chloride $^{\#M}$	-	1582	-	54	-	58	NDP	NDP	NDP	-	<2	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE)	-	-	-	-	-	-	0.050	0.035	6.546	-	<0.002	g/l	TM38/PM60
Chloride	-	-	-	-	-	-	-	-	-	-	<2	mg/kg	TM38/PM60
Fluoride	-	0.9	-	3.7	-	2.3	6.9	8.0	16.4	-	<0.3	mg/kg	TM173/PM20
Hexavalent Chromium $^{\#}$	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Nitrate as N	-	-	-	-	-	-	-	-	-	-	<2.5	mg/kg	TM38/PM20
Nitrate as NO3	-	<2.5	-	<2.5	-	<2.5	NDP	NDP	NDP	-	<2.5	mg/kg	TM38/PM20
Nitrate as NO3	-	-	-	-	-	-	<2.5	<2.5	<2.5	-	<2.5	mg/kg	TM38/PM60
Nitrate as N	-	-	-	-	-	-	-	-	-	-	<2.5	mg/kg	TM38/PM60
Sulphate as SO4 (2:1 Ext) $^{\#M}$	-	-	-	-	-	-	-	-	-	-	<0.0015	g/l	TM38/PM20
Chromium III	81.4	60.0	60.4	71.5	64.0	65.2	NDP	NDP	NDP	50.1	<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	NONE/NONE
Organic Matter	0.7	2.0	1.0	3.9	0.6	7.9	NDP	NDP	NDP	0.6	<0.2	%	TM21/PM24
Sulphide	-	<10	-	<100$_{AB}$	-	53	<10	30	21	-	<10	mg/kg	TM107/PM119
pH $^{\#M}$	7.85	7.52	8.52	7.55	8.09	7.34	7.67	7.22	7.67	8.28	<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	NDP	NDP	NDP	Clay		None	PM13/PM0

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Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5333	18/5333	18/5333	18/5333	18/5333	18/5333	18/5384	18/5384	18/5384	18/5384			
J E Sample No.	13-15	16-18	19-21	22-24	25-27	28-29	1-3	7-9	13-15	19-21			
Sample ID	TP08	WS02	TP05	WS05	TP04	WS03	TP06	TP01	TP02	WS06			
Depth	0.20-0.50	0.00-0.50	0.50-0.70	0.50-1.00	0.80-1.00	0.00-1.20	0.40-0.60	0.70-0.90	0.30-0.50	0.00-1.20			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V B	V J B	V J B	V J B	V J B			
Sample Date	09/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	11/04/2018	11/04/2018	11/04/2018	11/04/2018	11/04/2018	11/04/2018	12/04/2018	12/04/2018	12/04/2018	12/04/2018			
Sample Colour	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	NDP	NDP	NDP	Medium Brown		None	PM13/PM0
Other Items	chalk, carbon	carbon	vegetation, chalk	vegetation, carbon, stones	chalk	vegetation,stones	NDP	NDP	NDP	stones, chalk, vegetation		None	PM13/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5384	18/5384	18/5384	18/5455	18/5775	18/5775					LOD/LOR	Units	Method No.
J E Sample No.	22-24	25-27	28-30	1-3	1-3	4-6							
Sample ID	BH03	WS07	WS08	BH02	BH04	BH05							
Depth	1.50-2.00	0.30-0.80	0.00-1.20	0.60-1.00	0.50-1.20	1.80-2.25							
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B							
Sample Date	10/04/2018	11/04/2018	11/04/2018	11/04/2018	16/04/2018	17/04/2018							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	12/04/2018	12/04/2018	12/04/2018	13/04/2018	18/04/2018	18/04/2018							
Arsenic $^{\#M}$	8.9	7.9	12.7	NDP	9.3	8.0					<0.5	mg/kg	TM30/PM15
Barium $^{\#M}$	133	120	116	NDP	127	129					<1	mg/kg	TM30/PM15
Beryllium	1.2	1.0	1.3	NDP	1.4	1.2					<0.5	mg/kg	TM30/PM15
Cadmium $^{\#M}$	0.2	0.6	0.2	NDP	0.2	0.1					<0.1	mg/kg	TM30/PM15
Chromium $^{\#M}$	59.8	67.0	112.0	NDP	62.1	34.6					<0.5	mg/kg	TM30/PM15
Copper $^{\#M}$	11	8	6	NDP	14	11					<1	mg/kg	TM30/PM15
Lead $^{\#M}$	13	21	19	NDP	12	12					<5	mg/kg	TM30/PM15
Mercury $^{\#M}$	<0.1	<0.1	<0.1	NDP	<0.1	<0.1					<0.1	mg/kg	TM30/PM15
Nickel $^{\#M}$	39.4	22.3	27.6	NDP	30.2	29.6					<0.7	mg/kg	TM30/PM15
Selenium $^{\#M}$	<1	<1	1	NDP	<1	<1					<1	mg/kg	TM30/PM15
Total Sulphate as SO4 $^{\#M}$	-	-	-	NDP	-	439					<50	mg/kg	TM50/PM29
Vanadium	42	40	53	NDP	49	36					<1	mg/kg	TM30/PM15
Water Soluble Boron $^{\#M}$	0.8	1.2	1.1	NDP	1.0	1.0					<0.1	mg/kg	TM74/PM32
Zinc $^{\#M}$	61	93	79	NDP	55	59					<5	mg/kg	TM30/PM15
Arsenic	-	-	-	35.8	-	-					<0.5	mg/kg	TM30/PM62
Barium	-	-	-	350	-	-					<1	mg/kg	TM30/PM62
Beryllium	-	-	-	2.3	-	-					<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	1.7	-	-					<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	82.2	-	-					<0.5	mg/kg	TM30/PM62
Copper	-	-	-	291	-	-					<1	mg/kg	TM30/PM62
Lead	-	-	-	126	-	-					<5	mg/kg	TM30/PM62
Mercury	-	-	-	<0.1	-	-					<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	111.9	-	-					<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	4	-	-					<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	-	-	44355$_{AB}$	-	-					<50	mg/kg	TM50/PM29
Vanadium	-	-	-	227	-	-					<1	mg/kg	TM30/PM62
Water Soluble Boron	-	-	-	4.2	-	-					<0.1	mg/kg	TM74/PM61
Zinc	-	-	-	937	-	-					<5	mg/kg	TM30/PM62
VOC TICs	-	-	-	See Attached	-	-						None	TM15/PM10
Methyl Tertiary Butyl Ether $^{\#M}$	-	-	-	<6	-	<6					<6	ug/kg	TM15/PM10
Benzene $^{\#M}$	-	-	-	28	-	<5					<5	ug/kg	TM15/PM10
Toluene $^{\#M}$	-	-	-	6	-	<3					<3	ug/kg	TM15/PM10
Ethylbenzene $^{\#M}$	-	-	-	24	-	<3					<3	ug/kg	TM15/PM10
p/m-Xylene $^{\#M}$	-	-	-	78	-	<4					<4	ug/kg	TM15/PM10
o-Xylene $^{\#M}$	-	-	-	23	-	<4					<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	51	-	111					<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	51	-	103					<0	%	TM15/PM10
SVOC TICs	-	-	-	ND$_{AB}$	-	-						None	TM16/PM8

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Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5384	18/5384	18/5384	18/5455	18/5775	18/5775					LOD/LOR	Units	Method No.
J E Sample No.	22-24	25-27	28-30	1-3	1-3	4-6							
Sample ID	BH03	WS07	WS08	BH02	BH04	BH05							
Depth	1.50-2.00	0.30-0.80	0.00-1.20	0.60-1.00	0.50-1.20	1.80-2.25							
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B							
Sample Date	10/04/2018	11/04/2018	11/04/2018	11/04/2018	16/04/2018	17/04/2018							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	12/04/2018	12/04/2018	12/04/2018	13/04/2018	18/04/2018	18/04/2018							
TPH CWG													
Aliphatics													
>C5-C6 #M	-	-	-	<0.1	-	<0.1					<0.1	mg/kg	TM36/PM12
>C6-C8 #M	-	-	-	<0.1	-	<0.1					<0.1	mg/kg	TM36/PM12
>C8-C10	-	-	-	<0.1	-	<0.1					<0.1	mg/kg	TM36/PM12
>C10-C12 #M	-	-	-	23.2	-	<0.2					<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #M	-	-	-	251	-	<4					<4	mg/kg	TM5/PM8/PM16
>C16-C21 #M	-	-	-	858	-	<7					<7	mg/kg	TM5/PM8/PM16
>C21-C35 #M	-	-	-	2127	-	<7					<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	-	-	-	3259	-	<19					<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	-	-	-	<0.1	-	<0.1					<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	-	-	-	<0.1	-	<0.1					<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	-	-	-	<0.1	-	<0.1					<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	-	-	-	<0.2	-	<0.2					<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	-	-	-	<4	-	<4					<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	-	-	-	<7	-	<7					<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	-	-	-	40	-	<7					<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	-	-	-	40	-	<19					<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	-	-	3299	-	<38					<38	mg/kg	TM5/TM36/PM8/PM12/PM16
Natural Moisture Content	17.1	17.6	24.9	NDP	16.0	16.5					<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	-	-	-	-	-	<0.6					<0.6	mg/kg	TM38/PM20
Ammoniacal Nitrogen as NH4	<0.6	<0.6	<0.6	12.8	-	-					<0.6	mg/kg	TM38/PM20
Chloride #M	-	-	-	NDP	-	17					<2	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE)	-	-	-	-	-	-					<0.002	g/l	TM38/PM60
Chloride	-	-	-	11	-	-					<2	mg/kg	TM38/PM60
Fluoride	-	-	-	11.2	-	<0.3					<0.3	mg/kg	TM173/PM20
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.3	mg/kg	TM38/PM20
Nitrate as N	-	-	-	NDP	-	-					<2.5	mg/kg	TM38/PM20
Nitrate as NO3	-	-	-	-	-	<2.5					<2.5	mg/kg	TM38/PM20
Nitrate as NO3	-	-	-	-	-	-					<2.5	mg/kg	TM38/PM60
Nitrate as N	-	-	-	<2.5	-	-					<2.5	mg/kg	TM38/PM60
Sulphate as SO4 (2:1 Ext) #M	-	-	-	-	-	0.0965					<0.0015	g/l	TM38/PM20
Chromium III	59.8	67.0	112.0	NDP	62.1	34.6					<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	-	-					<0.5	mg/kg	NONE/NONE
Organic Matter	0.7	1.1	0.9	NDP	0.6	0.6					<0.2	%	TM21/PM24
Sulphide	-	-	-	<10	-	-					<10	mg/kg	TM107/PM119
pH #M	8.27	8.32	7.86	7.17	7.91	8.12					<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay	Clay	NDP	Clay	Clay						None	PM13/PM0

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Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5384	18/5384	18/5384	18/5455	18/5775	18/5775							
J E Sample No.	22-24	25-27	28-30	1-3	1-3	4-6							
Sample ID	BH03	WS07	WS08	BH02	BH04	BH05							
Depth	1.50-2.00	0.30-0.80	0.00-1.20	0.60-1.00	0.50-1.20	1.80-2.25							
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V J B	V J B							
Sample Date	10/04/2018	11/04/2018	11/04/2018	11/04/2018	16/04/2018	17/04/2018							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1					LOD/LOR	Units	Method No.
Date of Receipt	12/04/2018	12/04/2018	12/04/2018	13/04/2018	18/04/2018	18/04/2018							
Sample Colour	Medium Brown	Medium Brown	Medium Brown	NDP	Medium Brown	Medium Brown						None	PM13/PM0
Other Items	chalk	sand, stones,	sand,vegetation, stones	NDP	chalk, stones	chalk						None	PM13/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Job No.	18/7222	18/7222	18/7222	18/7222	18/7222	18/7222	18/7222	18/7222					
J E Sample No.	1-7	8-14	15-21	22-28	29-35	36-42	43-49	50-56					
Sample ID	BH01	BH02	BH03	WS03	WS04	WS05	WS06	DUP01					
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G					
Sample Date	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water					
Batch Number	1	1	1	1	1	1	1	1			LOD/LOR	Units	Method No.
Date of Receipt	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018					
Dissolved Arsenic$^{\#}$	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5			<2.5	ug/l	TM30/PM14
Dissolved Barium$^{\#}$	57	63	63	41	53	33	44	62			<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Boron	132	73	<12	49	54	178	34	<12			<12	ug/l	TM30/PM14
Dissolved Cadmium$^{\#}$	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Total Dissolved Chromium$^{\#}$	6.2	6.8	<1.5	6.3	5.4	3.3	<1.5	6.7			<1.5	ug/l	TM30/PM14
Dissolved Copper$^{\#}$	<7	<7	<7	<7	<7	<7	<7	<7			<7	ug/l	TM30/PM14
Dissolved Lead$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/l	TM30/PM14
Dissolved Mercury$^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM30/PM14
Dissolved Nickel$^{\#}$	2	<2	5	4	3	8	4	5			<2	ug/l	TM30/PM14
Dissolved Selenium$^{\#}$	<3	5	16	<3	<3	<3	<3	<3			<3	ug/l	TM30/PM14
Dissolved Vanadium$^{\#}$	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Zinc$^{\#}$	12	6	7	<3	<3	10	6	6			<3	ug/l	TM30/PM14
VOC TICs	-	-	-	ND	ND	ND	ND	-				None	TM15/PM10
Methyl Tertiary Butyl Ether$^{\#}$	-	-	-	<0.1	2.8	$<0.2_{AA}$	<0.1	-			<0.1	ug/l	TM15/PM10
Benzene$^{\#}$	-	-	-	<0.5	<0.5	<0.5	<0.5	-			<0.5	ug/l	TM15/PM10
Toluene$^{\#}$	-	-	-	<5	<5	<5	<5	-			<5	ug/l	TM15/PM10
Ethylbenzene$^{\#}$	-	-	-	<1	<1	<1	<1	-			<1	ug/l	TM15/PM10
p/m-Xylene$^{\#}$	-	-	-	<2	<2	<2	<2	-			<2	ug/l	TM15/PM10
o-Xylene$^{\#}$	-	-	-	<1	<1	<1	<1	-			<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	95	96	98	96	-			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	96	96	100	101	-			<0	%	TM15/PM10
TPH CWG													
Aliphatics													
>C5-C6$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C6-C8$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C8-C10$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C10-C12$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>C12-C16$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C16-C21$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C21-C35$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35$^{\#}$	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Report : **Liquid**

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

J E Job No.	18/7222	18/7222	18/7222	18/7222	18/7222	18/7222	18/7222	18/7222					
J E Sample No.	1-7	8-14	15-21	22-28	29-35	36-42	43-49	50-56					
Sample ID	BH01	BH02	BH03	WS03	WS04	WS05	WS06	DUP01					
Depth													
COC No / misc													
Containers	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G					
Sample Date	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018	12/05/2018			LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30
MTBE #	<5	<5	<5	-	-	-	-	<5			<5	ug/l	TM31/PM12
Benzene #	<5	<5	<5	-	-	-	-	<5			<5	ug/l	TM31/PM12
Toluene #	<5	<5	<5	-	-	-	-	<5			<5	ug/l	TM31/PM12
Ethylbenzene #	<5	<5	<5	-	-	-	-	<5			<5	ug/l	TM31/PM12
m/p-Xylene #	<5	<5	<5	-	-	-	-	<5			<5	ug/l	TM31/PM12
o-Xylene #	<5	<5	<5	-	-	-	-	<5			<5	ug/l	TM31/PM12
Sulphate as SO4 #	62.9	42.8	94.2	417.5	720.3	983.9	299.8	76.4			<0.5	mg/l	TM38/PM0
Chloride #	24.3	18.2	26.8	563.4	1280.0	304.2	69.2	26.2			<0.3	mg/l	TM38/PM0
Nitrate as N #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/l	TM38/PM0
Ortho Phosphate as P #	0.19	0.15	<0.03	0.12	<0.03	<0.03	<0.03	<0.03			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.42	0.27	0.06	0.06	0.09	0.87	0.05	0.06			<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6	<6	<6			<6	ug/l	TM38/PM0
Total Dissolved Chromium III	6	7	<6	6	<6	<6	<6	7			<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3 #	352	300	276	346	378	612	762	274			<1	mg/l	TM75/PM0
Dissolved Organic Carbon #	<2	<2	<2	6	9	38	3	<2			<2	mg/l	TM60/PM0
Dissolved Iron II	<0.02	<0.02	0.02	0.10	0.26	1.63	0.15	<0.02			<0.02	mg/l	TM48/PM0
pH #	7.63	7.40	7.31	6.95	6.83	6.97	7.19	7.28			<0.01	pH units	TM73/PM0
Total Suspended Solids #	35	<10	19	10	14	21	1787	15			<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	AECOM	**Report :**	**Misc**
Reference:	60569745		
Location:	VP1 (TLOR)	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Alex Freeman		

J E Job No.	18/5166	18/5333	18/5384	18/5455									
J E Sample No.	1-3	1-3	1-3	1-3									
Sample ID	BH06	TT01	TP06	BH02									
Depth	0.40-0.70	1.70-1.90	0.40-0.60	0.60-1.00							Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J B	V J B	V J B	V J B									
Sample Date	05/04/2018	09/04/2018	10/04/2018	11/04/2018									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	11/04/2018	12/04/2018	13/04/2018									
Sample Temperature	5.5	8.8	6.7	3.0							<0.1	Degrees C	NONE/NONE

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: AECOM

Reference: 60569745

Location: VP1 (TLOR)

Contact: Alex Freeman

SVOC Report : **Solid**

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5166	18/5166	18/5333	18/5333	18/5333	18/5384	18/5384	18/5384	18/5455	18/5775			
J E Sample No.	4-6	13-15	16-18	22-24	28-29	1-3	7-9	13-15	1-3	4-6			
Sample ID	BH01	WS01	WS02	WS05	WS03	TP06	TP01	TP02	BH02	BH05			
Depth	0.45-0.70	1.00-1.25	0.00-0.50	0.50-1.00	0.00-1.20	0.40-0.60	0.70-0.90	0.30-0.50	0.60-1.00	1.80-2.25			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V B	V J B	V J B	V J B	V J B	V J B			
Sample Date	05/04/2018	06/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018	17/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	07/04/2018	11/04/2018	11/04/2018	11/04/2018	12/04/2018	12/04/2018	12/04/2018	13/04/2018	18/04/2018			
SVOC MS													
Phenols													
2-Chlorophenol $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2-Methylphenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2-Nitrophenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2,4-Dichlorophenol $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Methylphenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Nitrophenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Pentachlorophenol	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Phenol $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2-Methylnaphthalene $^{\#M}$	1998$_{AB}$	<100$_{AB}$	127	44	53	<10	2857	4537	1136$_{AB}$	<10	<10	ug/kg	TM16/PM8
Naphthalene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	601	1360	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Acenaphthylene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Acenaphthene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	1651	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Fluorene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	2305	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Phenanthrene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	124	130	110	1872	7600	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Anthracene	<100$_{AB}$	<100$_{AB}$	<10	41	46	50	603	1072	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Fluoranthene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	29	26	23	<10	1569	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Pyrene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	171	110	91	2469	4180	2817$_{AB}$	<10	<10	ug/kg	TM16/PM8
Benzo(a)anthracene	<100$_{AB}$	<100$_{AB}$	<10	56	89	72	662	1520	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Chrysene	<100$_{AB}$	<100$_{AB}$	<10	288	318	258	2415	3179	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	<100$_{AB}$	<100$_{AB}$	<10	159	180	158	796	1190	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Benzo(a)pyrene	<100$_{AB}$	<100$_{AB}$	<10	105	89	96	938	1089	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	<100$_{AB}$	<100$_{AB}$	<10	47	37	40	237	263	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	<100$_{AB}$	<100$_{AB}$	<10	38	40	50	255	346	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	<100$_{AB}$	<100$_{AB}$	<10	104	114	105	581	591	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	<100$_{AB}$	<100$_{AB}$	<10	114	130	114	573	857	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	<100$_{AB}$	<100$_{AB}$	<10	45	50	44	223	333	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<1000$_{AB}$	<1000$_{AB}$	<100	<100	<100	<100	1926	3119	<1000$_{AB}$	<100	<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<1000$_{AB}$	<1000$_{AB}$	<100	<100	<100	<100	<100	<100	<1000$_{AB}$	<100	<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<1000$_{AB}$	<1000$_{AB}$	<100	<100	<100	<100	<100	<100	<1000$_{AB}$	<100	<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<1000$_{AB}$	<1000$_{AB}$	<100	<100	<100	<100	<100	<100	<1000$_{AB}$	<100	<100	ug/kg	TM16/PM8
Diethyl phthalate	<1000$_{AB}$	<1000$_{AB}$	<100	<100	<100	<100	<100	<100	<1000$_{AB}$	<100	<100	ug/kg	TM16/PM8
Dimethyl phthalate $^{\#M}$	<1000$_{AB}$	<1000$_{AB}$	<100	<100	<100	<100	<100	<100	<1000$_{AB}$	<100	<100	ug/kg	TM16/PM8

Exova Jones Environmental

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

SVOC Report : **Solid**

J E Job No.	18/5166	18/5166	18/5333	18/5333	18/5333	18/5384	18/5384	18/5384	18/5455	18/5775			
J E Sample No.	4-6	13-15	16-18	22-24	28-29	1-3	7-9	13-15	1-3	4-6			
Sample ID	BH01	WS01	WS02	WS05	WS03	TP06	TP01	TP02	BH02	BH05			
Depth	0.45-0.70	1.00-1.25	0.00-0.50	0.50-1.00	0.00-1.20	0.40-0.60	0.70-0.90	0.30-0.50	0.60-1.00	1.80-2.25			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V B	V J B	V J B	V J B	V J B	V J B			
Sample Date	05/04/2018	06/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018	17/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	07/04/2018	11/04/2018	11/04/2018	11/04/2018	12/04/2018	12/04/2018	12/04/2018	13/04/2018	18/04/2018			
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2-Nitroaniline	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
3-Nitroaniline	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Bromophenylphenylether $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Chloroaniline	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
4-Nitroaniline	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Azobenzene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Carbazole	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Dibenzofuran $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	818	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Hexachlorobenzene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Hexachlorobutadiene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Hexachloroethane	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Isophorone $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Nitrobenzene $^{\#M}$	<100$_{AB}$	<100$_{AB}$	<10	<10	<10	<10	<10	<10	<100$_{AB}$	<10	<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	112$_{AB}$	108$_{AB}$	114	120	123	108	112	121	114$_{AB}$	119	<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	113$_{AB}$	113$_{AB}$	104	120	122	116	114	115	130$_{AB}$	127	<0	%	TM16/PM8

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	AECOM	**SVOC Report :**	**Liquid**
Reference:	60569745		
Location:	VP1 (TLOR)		
Contact:	Alex Freeman		

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/7222	18/7222	18/7222	18/7222									
J E Sample No.	22-28	29-35	36-42	43-49									
Sample ID	WS03	WS04	WS05	WS06									
Depth													
COC No / misc													
Containers	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G									
Sample Date	10/05/2018	10/05/2018	10/05/2018	10/05/2018									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	12/05/2018	12/05/2018	12/05/2018	12/05/2018									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

SVOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/7222	18/7222	18/7222	18/7222									
J E Sample No.	22-28	29-35	36-42	43-49									
Sample ID	WS03	WS04	WS05	WS06									
Depth													
COC No / misc													
Containers	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G									
Sample Date	10/05/2018	10/05/2018	10/05/2018	10/05/2018									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	12/05/2018	12/05/2018	12/05/2018	12/05/2018							LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	122	118	113	115							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	130	125	129	129							<0	%	TM16/PM30

Client Name:	AECOM	**VOC Report :**	**Solid**
Reference:	60569745		
Location:	VP1 (TLOR)		
Contact:	Alex Freeman		

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/5166	18/5166	18/5333	18/5333	18/5333	18/5384	18/5384	18/5384	18/5455	18/5775			
J E Sample No.	4-6	13-15	16-18	22-24	28-29	1-3	7-9	13-15	1-3	4-6			
Sample ID	BH01	WS01	WS02	WS05	WS03	TP06	TP01	TP02	BH02	BH05			
Depth	0.45-0.70	1.00-1.25	0.00-0.50	0.50-1.00	0.00-1.20	0.40-0.60	0.70-0.90	0.30-0.50	0.60-1.00	1.80-2.25			
COC No / misc													
Containers	V J B	V J B	V J B	V J B	V B	V J B	V J B	V J B	V J B	V J B			
Sample Date	05/04/2018	06/04/2018	10/04/2018	10/04/2018	10/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018	17/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	07/04/2018	07/04/2018	11/04/2018	11/04/2018	11/04/2018	12/04/2018	12/04/2018	12/04/2018	13/04/2018	18/04/2018			
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether $^{\#M}$	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Chloromethane $^{\#}$	<3	<3	<3	<3	<3	<3	<3	<3	5	<3	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/kg	TM15/PM10
Chloroethane $^{\#M}$	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Trichlorofluoromethane $^{\#M}$	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) $^{\#M}$	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) $^{\#}$	<30	<30	<30	<30	<30	<30	78	41	<30	<30	<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene $^{\#}$	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethane $^{\#M}$	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10
cis-1-2-Dichloroethene $^{\#M}$	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromochloromethane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Chloroform $^{\#M}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,1,1-Trichloroethane $^{\#M}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,1-Dichloropropene $^{\#}$	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Carbon tetrachloride $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichloroethane $^{\#M}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
Benzene $^{\#M}$	46	47	<5	<5	<5	<5	45	60	28	<5	<5	ug/kg	TM15/PM10
Trichloroethene (TCE) $^{\#M}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2-Dichloropropane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Dibromomethane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromodichloromethane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Toluene $^{\#M}$	7	15	<3	<3	<3	<3	5	19	6	<3	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Tetrachloroethene (PCE) $^{\#}$	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3-Dichloropropane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Dibromochloromethane $^{\#M}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2-Dibromoethane $^{\#}$	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Chlorobenzene $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane $^{\#M}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
Ethylbenzene $^{\#M}$	60	31	<3	<3	<3	<3	39	121	24	<3	<3	ug/kg	TM15/PM10
p/m-Xylene $^{\#M}$	114	89	<4	<4	9	<4	213	115	78	<4	<4	ug/kg	TM15/PM10
o-Xylene $^{\#M}$	36	31	<4	<4	<4	<4	49	54	23	<4	<4	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15_A/PM10
Bromoform	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Isopropylbenzene $^{\#}$	24	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane $^{\#M}$	263	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Propylbenzene $^{\#}$	56	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene $^{\#}$	20	<3	<3	<3	<3	<3	44	51	<3	<3	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10
tert-Butylbenzene $^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene $^{\#}$	315	111	<6	<6	<6	<6	606	833	91	<6	<6	ug/kg	TM15/PM10
sec-Butylbenzene $^{\#}$	203	<4	<4	<4	<4	<4	50	<4	<4	<4	<4	ug/kg	TM15/PM10
4-Isopropyltoluene $^{\#}$	92	<4	<4	<4	<4	<4	75	1185	<4	<4	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene $^{\#}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
n-Butylbenzene $^{\#}$	<4	<4	<4	<4	<4	<4	63	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene $^{\#M}$	<4	<4	<4	<4	<4	<4	<4	926	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane $^{\#}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene $^{\#}$	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	66	252	<27	<27	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene $^{\#}$	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	57	57	93	92	78	85	52	52	51	111	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	59	55	86	77	64	74	58	54	51	103	<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

VOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

J E Job No.	18/7222	18/7222	18/7222	18/7222									
J E Sample No.	22-28	29-35	36-42	43-49									
Sample ID	WS03	WS04	WS05	WS06									
Depth													
COC No / misc													
Containers	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G	V H HN HCL P G									
Sample Date	10/05/2018	10/05/2018	10/05/2018	10/05/2018									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	12/05/2018	12/05/2018	12/05/2018	12/05/2018									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	2.8	<0.2$_{AA}$	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	95	96	98	96							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	96	100	101							<0	%	TM15/PM10

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Job number: 18/5166
Method: VOC
Sample number: 4
Matrix: Solid
Sample identity: BH01
Sample depth: 0.45-0.70
Sample Type: Soil
Units: ug/kg

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
565-59-3	Pentane, 2,3-dimethyl-	4.035	90	163
16883-48-0	Cyclopentane, 1,2,4-trimethyl-, (1.alpha.,2.beta.,4.alpha.)-	4.626	91	139
565-75-3	Pentane, 2,3,4-trimethyl-	4.689	80	299
560-21-4	Pentane, 2,3,3-trimethyl-	4.746	80	291
2207-01-4	Cyclohexane, 1,2-dimethyl-, cis-	5.029 - 5.348	87,91	341
6876-23-9	Cyclohexane, 1,2-dimethyl-, trans-	5.105	97	350
2234-75-5	Cyclohexane, 1,2,4-trimethyl-	5.394	80	461
7667-60-9	Cyclohexane, 1,2,4-trimethyl-, (1.alpha.,2.beta.,4.beta.)-	5.493	95	340
3114-55-4	Chlorobenzene-d5	5.621	91	1372
5911-04-6	Nonane, 3-methyl-	5.956	90	820
506-51-4	n-Tetracosanol-1	6.459	80	623
2425-77-6	1-Decanol, 2-hexyl-	6.627	90	890
1678-81-5	Cyclohexane, 1,2,3-trimethyl-, (1.alpha.,2.beta.,3.alpha.)-	6.789	89	372
933-98-2	Benzene, 1-ethyl-2,3-dimethyl-	7.109	90	1034
76089-59-3	1,3-Cyclopentadiene, 1,2,3,4-tetramethyl-5-methylene-	7.344	80	396
2958-76-1	Naphthalene, decahydro-2-methyl-	7.382	86	876

Job number: 18/5384
Method: **VOC**
Sample number: 7
Matrix: **Solid**
Sample identity: TP01
Sample depth: 0.70-0.90
Sample Type: Soil
Units: ug/kg

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
-	trans-Decalin, 2-methyl-	7.270	89	357
2958-76-1	Naphthalene, decahydro-2-methyl-	7.384	83	292

All solid results are expressed on a dry weight basis unless stated otherwise.

Job number:	18/5384	**Method:**	**VOC**
Sample number:	13	**Matrix:**	**Solid**
Sample identity:	TP02		
Sample depth:	0.30-0.50		
Sample Type:	Soil		
Units:	ug/kg		

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
96-14-0	Pentane, 3-methyl-	3.174	90	334
108-08-7	Pentane, 2,4-dimethyl-	3.646	83	154
565-59-3	Pentane, 2,3-dimethyl-	4.034	94	828
589-34-4	Hexane, 3-methyl-	4.079	94	783
1638-26-2	Cyclopentane, 1,1-dimethyl-	4.108	86	352
872-56-0	Isopropylcyclobutane	4.233	93	432
2815-58-9	Cyclopentane, 1,2,4-trimethyl-	4.626	91	957
589-53-7	Heptane, 4-methyl-	4.778	91	955
2207-01-4	Cyclohexane, 1,2-dimethyl-, cis-	5.023	81	1512
6876-23-9	Cyclohexane, 1,2-dimethyl-, trans-	5.105	97	2017
2207-03-6	Cyclohexane, 1,3-dimethyl-, trans-	5.153	93	1110
2234-75-5	Cyclohexane, 1,2,4-trimethyl-	5.336	83	664
3073-66-3	Cyclohexane, 1,1,3-trimethyl-	5.394	94	4705
619-99-8	Hexane, 3-ethyl-	5.446	80	2024
2216-33-3	Octane, 3-methyl-	5.539	80	1413
3728-57-2	Cyclopentane, 1-methyl-2-propyl-	5.707	93	1148
6236-88-0	Cyclohexane, 1-ethyl-4-methyl-, trans-	5.739	91	2325
19398-86-8	cis-3-Decene	5.810	81	425
15869-94-0	Octane, 3,6-dimethyl-	5.955	91	3026
2847-72-5	Decane, 4-methyl-	6.512	83	3218
-	Oxalic acid, cyclobutyl heptadecyl ester	6.627	80	1626
7058-01-7	Cyclohexane, (1-methylpropyl)-	6.680	81	1990
105-05-5	Benzene, 1,4-diethyl-	6.871	84	754
527-84-4	o-Cymene	7.109	94	1704
-	trans-Decalin, 2-methyl-	7.274	87	2398
95-93-2	Benzene, 1,2,4,5-tetramethyl-	7.344	94	623
2958-76-1	Naphthalene, decahydro-2-methyl-	7.383	92	1088

Job number: 18/5455
Method: VOC
Sample number: 1
Matrix: Solid
Sample identity: BH02
Sample depth: 0.60-1.00
Sample Type: Soil
Units: ug/kg

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
463-58-1	Carbonyl sulfide	1.274	90	186

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number:	18/5166	**Method:**	**SVOC**
Sample number:	5	**Matrix:**	**Solid**
Sample identity:	BH01		
Sample depth:	0.45-0.70		
Sample Type:	Soil		
Units:	ug/kg		

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	10.545	95	1411

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number:	18/5166	**Method:**	**SVOC**
Sample number:	14	**Matrix:**	**Solid**
Sample identity:	WS01		
Sample depth:	1.00-1.25		
Sample Type:	Soil		
Units:	ug/kg		

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
3891-98-3	Dodecane, 2,6,10-trimethyl-	10.545	94	1528

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 18/5384
Method: **SVOC**
Sample number: 8
Matrix: **Solid**
Sample identity: TP01
Sample depth: 0.70-0.90
Sample Type: Soil
Units: ug/kg

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
493-02-7	Naphthalene, decahydro-, trans-	5.805	90	1122
-	trans-Decalin, 2-methyl-	6.326	97	1050
2958-76-1	Naphthalene, decahydro-2-methyl-	6.473	95	2269
62199-51-3	Cyclopentane, 1-pentyl-2-propyl-	7.673	86	1382
90-12-0	Naphthalene, 1-methyl-	7.738	93	3064
3891-98-3	Dodecane, 2,6,10-trimethyl-	8.265	90	2465
13360-61-7	1-Pentadecene	8.387	83	3966
581-42-0	Naphthalene, 2,6-dimethyl-	8.465	97	788
582-16-1	Naphthalene, 2,7-dimethyl-	8.569	93	1403
2131-42-2	Naphthalene, 1,4,6-trimethyl-	9.194	96	4316
2245-38-7	Naphthalene, 1,6,7-trimethyl-	9.293	97	2204
13187-99-0	2-Bromo dodecane	9.775	89	3906
529-05-5	Chamazulene	9.931	93	2686
7350-72-3	1,4-Methanonaphthalene,1,4-dihydro-9-((1-methylethylidene)-	10.004	93	4447
55045-07-3	Dodecane, 2-methyl-8-propyl-	10.064	86	6256
832-69-9	Phenanthrene, 1-methyl-	10.923	86	6045
832-64-4	Phenanthrene, 4-methyl-	11.002	90	5121
89816-75-1	2,6-Dimethyldibenzothiophene	11.262	80	5352
2381-21-7	Pyrene, 1-methyl-	12.528	89	2957
2175-90-8	6,6-Diphenylfulvene	13.086	91	1926
64401-21-4	Pyrene, 1,3-dimethyl-	13.206	90	2930
288246-53-7	Pyridine-3-carboxamide, oxime, N-(2-trifluoromethylphenyl)-	13.865	91	2246
54482-31-4	D-Homoandrostane, (5.alpha.,13.alpha.)-	14.822	90	1244
98496-82-3	Antra-9,10-quinone, 1-(3-hydrohy-3-phenyl-1-triazenyl)-	17.032	86	3885

Job number:	18/5384	**Method:**	**SVOC**
Sample number:	14	**Matrix:**	**Solid**
Sample identity:	TP02		
Sample depth:	0.30-0.50		
Sample Type:	Soil		
Units:	ug/kg		

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
15869-94-0	Octane, 3,6-dimethyl-	4.547	90	1479
14676-29-0	Heptane, 3-ethyl-2-methyl-	4.635	81	1611
2847-72-5	Decane, 4-methyl-	5.500	83	2762
1678-93-9	Cyclohexane, butyl-	5.581	83	657
493-02-7	Naphthalene, decahydro-, trans-	5.804	93	2381
527-84-4	o-Cymene	5.918	92	2969
933-98-2	Benzene, 1-ethyl-2,3-dimethyl-	6.159	90	1224
95-93-2	Benzene, 1,2,4,5-tetramethyl-	6.305	97	1971
-	trans-Decalin, 2-methyl-	6.326	98	246
13150-81-7	2,6-Dimethyldecane	6.389	89	2040
1758-85-6	Benzene, 2,4-diethyl-1-methyl-	6.609	86	868
53172-84-2	Benzene, (1-methyl-1-butenyl)-	7.438	90	2858
75163-97-2	Octadecane, 2,6-dimethyl-	7.594	90	2717
62199-51-3	Cyclopentane, 1-pentyl-2-propyl-	7.673	90	2810
2613-76-5	1H-Indene, 2,3-dihydro-1,1,3-trimethyl-	7.843	89	7319
3891-98-3	Dodecane, 2,6,10-trimethyl-	8.272	94	7253
582-16-1	Naphthalene, 2,7-dimethyl-	8.465	97	11515
2131-42-2	Naphthalene, 1,4,6-trimethyl-	8.953	96	4000
2245-38-7	Naphthalene, 1,6,7-trimethyl-	9.194	98	7282
829-26-5	Naphthalene, 2,3,6-trimethyl-	9.293	98	7932
3892-00-0	Pentadecane, 2,6,10-trimethyl-	9.775	93	8945
529-05-5	Chamazulene	9.859	94	1926
1921-70-6	Pentadecane, 2,6,10,14-tetramethyl-	10.064	96	17326
7350-72-3	1,4-Methanonaphthalene,1,4-dihydro-9-((1-methylethylidene)-	10.112	86	3154
51282-56-5	Ethyl 5-chloro-2-nitrobenzoate	10.232	92	1565
638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	10.545	96	19194
67388-11-8	4-Methylnaphtho[1,2-b]thiophene	10.803	95	6863
832-64-4	Phenanthrene, 4-methyl-	10.903	90	3804
610-48-0	Anthracene, 1-methyl-	10.923	95	8606
2531-84-2	Phenanthrene, 2-methyl-	11.012	95	9265

Job number: 18/5384 **Method:** SVOC
Sample number: 14 **Matrix:** Solid
Sample identity: TP02
Sample depth: 0.30-0.50
Sample Type: Soil
Units: ug/kg

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
89816-75-1	2,6-Dimethyldibenzothiophene	11.262	96	4651
31317-19-8	2,7-Dimethyldibenzothiophene	11.371	93	5853
2789-88-0	di-p-Tolylacetylene	11.511	93	6689
85385-68-8	[14]Annulene, 1,6:8,13-bis(methano)-, syn	11.531	93	6356
4443-60-1	Cyclohexane, (1-hexyltetradecyl)-	11.700	81	3109
2380-32-7	Octadecanoic acid, 17-oxo-, methyl ester	12.199	90	519
25186-71-4	3-Chloro-1-anthraquinonecarboxylic acid	13.985	91	1725
288246-53-7	Pyridine-3-carboxamide, oxime, N-(2-trifluoromethylphenyl)-	14.324	91	2517
98496-82-3	Antra-9,10-quinone, 1-(3-hydrohy-3-phenyl-1-triazenyl)-	15.905	86	1164
112-95-8	Eicosane	16.039	90	2080
62016-79-9	Heptacosane, 1-chloro-	16.996	97	12910

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/5166	1	BH06	0.40-0.70	3	11/04/2018	**General Description (Bulk Analysis)**	soil-stones
					11/04/2018	**Asbestos Fibres**	NAD
					11/04/2018	**Asbestos Fibres (2)**	NAD
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos ACM (2)**	NAD
					11/04/2018	**Asbestos Type**	NAD
					11/04/2018	**Asbestos Type (2)**	NAD
					11/04/2018	**Asbestos Level Screen**	NAD
18/5166	1	BH01	0.45-0.70	6	11/04/2018	**General Description (Bulk Analysis)**	Soil/Stones
					11/04/2018	**Asbestos Fibres**	Fibre Bundles
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos Type**	Chrysotile
					11/04/2018	**Asbestos Level Screen**	less than 0.1%
					30/04/2018	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					30/04/2018	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					30/04/2018	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					30/04/2018	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					30/04/2018	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
18/5166	1	TT03	0.00-1.40	9	11/04/2018	**General Description (Bulk Analysis)**	Soil/Stones
					11/04/2018	**Asbestos Fibres**	NAD
					11/04/2018	**Asbestos Fibres (2)**	NAD
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos ACM (2)**	NAD
					11/04/2018	**Asbestos Type**	NAD
					11/04/2018	**Asbestos Type (2)**	NAD
					11/04/2018	**Asbestos Level Screen**	NAD
18/5166	1	TT02	0.50-1.20	12	11/04/2018	**General Description (Bulk Analysis)**	soil/stones
					11/04/2018	**Asbestos Fibres**	NAD
					11/04/2018	**Asbestos Fibres (2)**	NAD
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos ACM (2)**	NAD
					11/04/2018	**Asbestos Type**	NAD
					11/04/2018	**Asbestos Type (2)**	NAD
					11/04/2018	**Asbestos Level Screen**	NAD

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/5166	1	WS01	1.00-1.25	15	11/04/2018	**General Description (Bulk Analysis)**	soil/stones
					11/04/2018	**Asbestos Fibres**	Fibre Bundles
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos Type**	Chrysotile
					11/04/2018	**Asbestos Level Screen**	less than 0.1%
					30/04/2018	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					30/04/2018	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					30/04/2018	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					30/04/2018	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					30/04/2018	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
18/5166	1	WS04	0.50	18	11/04/2018	**General Description (Bulk Analysis)**	soil/stones
					11/04/2018	**Asbestos Fibres**	NAD
					11/04/2018	**Asbestos Fibres (2)**	NAD
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos ACM (2)**	NAD
					11/04/2018	**Asbestos Type**	NAD
					11/04/2018	**Asbestos Type (2)**	NAD
					11/04/2018	**Asbestos Level Screen**	NAD
18/5166	1	TP10	0.40-0.60	21	11/04/2018	**General Description (Bulk Analysis)**	soil/stones
					11/04/2018	**Asbestos Fibres**	NAD
					11/04/2018	**Asbestos Fibres (2)**	NAD
					11/04/2018	**Asbestos ACM**	NAD
					11/04/2018	**Asbestos ACM (2)**	NAD
					11/04/2018	**Asbestos Type**	NAD
					11/04/2018	**Asbestos Type (2)**	NAD
					11/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	TT01	1.70-1.90	3	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	TP09	0.30-0.40	6	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	TP07	1.30-1.60	9	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/5333	1	TP07	1.30-1.60	9	16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	TP08	0.20-0.50	15	16/04/2018	**General Description (Bulk Analysis)**	soil.stones
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	WS02	0.00-0.50	18	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	TP05	0.50-0.70	21	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	WS05	0.50-1.00	24	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	TP04	0.80-1.00	27	16/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD
					16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5333	1	WS03	0.00-1.20	29	16/04/2018	**General Description (Bulk Analysis)**	soil.stones
					16/04/2018	**Asbestos Fibres**	NAD
					16/04/2018	**Asbestos Fibres (2)**	NAD
					16/04/2018	**Asbestos ACM**	NAD
					16/04/2018	**Asbestos ACM (2)**	NAD

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/5333	1	WS03	0.00-1.20	29	16/04/2018	**Asbestos Type**	NAD
					16/04/2018	**Asbestos Type (2)**	NAD
					16/04/2018	**Asbestos Level Screen**	NAD
18/5384	1	TP06	0.40-0.60	3	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	Fibre Bundles
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos Type**	Chrysotile
					17/04/2018	**Asbestos Level Screen**	less than 0.1%
					26/04/2018	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					26/04/2018	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					26/04/2018	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
18/5384	1	TP01	0.70-0.90	9	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	Fibre Bundles
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos Type**	Chrysotile
					17/04/2018	**Asbestos Level Screen**	less than 0.1%
					26/04/2018	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					26/04/2018	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					26/04/2018	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
18/5384	1	TP02	0.30-0.50	15	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	Fibre Bundles
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos Type**	Chrysotile
					17/04/2018	**Asbestos Level Screen**	less than 0.1%
					26/04/2018	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					26/04/2018	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					26/04/2018	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
18/5384	1	WS06	0.00-1.20	21	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	NAD
					17/04/2018	**Asbestos Fibres (2)**	NAD
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos ACM (2)**	NAD
					17/04/2018	**Asbestos Type**	NAD
					17/04/2018	**Asbestos Type (2)**	NAD
					17/04/2018	**Asbestos Level Screen**	NAD
18/5384	1	BH03	1.50-2.00	24	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	NAD
					17/04/2018	**Asbestos Fibres (2)**	NAD
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos ACM (2)**	NAD
					17/04/2018	**Asbestos Type**	NAD
					17/04/2018	**Asbestos Type (2)**	NAD

Client Name:	AECOM
Reference:	60569745
Location:	VP1 (TLOR)
Contact:	Alex Freeman

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/5384	1	BH03	1.50-2.00	24	17/04/2018	**Asbestos Level Screen**	NAD
18/5384	1	WS07	0.30-0.80	27	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	NAD
					17/04/2018	**Asbestos Fibres (2)**	NAD
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos ACM (2)**	NAD
					17/04/2018	**Asbestos Type**	NAD
					17/04/2018	**Asbestos Type (2)**	NAD
					17/04/2018	**Asbestos Level Screen**	NAD
18/5384	1	WS08	0.00-1.20	30	17/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					17/04/2018	**Asbestos Fibres**	NAD
					17/04/2018	**Asbestos Fibres (2)**	NAD
					17/04/2018	**Asbestos ACM**	NAD
					17/04/2018	**Asbestos ACM (2)**	NAD
					17/04/2018	**Asbestos Type**	NAD
					17/04/2018	**Asbestos Type (2)**	NAD
					17/04/2018	**Asbestos Level Screen**	NAD
18/5455	1	BH02	0.60-1.00	3	18/04/2018	**General Description (Bulk Analysis)**	soil/stones
					18/04/2018	**Asbestos Fibres**	Fibre Bundles
					18/04/2018	**Asbestos ACM**	NAD
					18/04/2018	**Asbestos Type**	Chrysotile
					18/04/2018	**Asbestos Level Screen**	less than 0.1%
					26/04/2018	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					26/04/2018	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					26/04/2018	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					26/04/2018	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
18/5775	1	BH04	0.50-1.20	3	24/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					24/04/2018	**Asbestos Fibres**	NAD
					24/04/2018	**Asbestos Fibres (2)**	NAD
					24/04/2018	**Asbestos ACM**	NAD
					24/04/2018	**Asbestos ACM (2)**	NAD
					24/04/2018	**Asbestos Type**	NAD
					24/04/2018	**Asbestos Type (2)**	NAD
					24/04/2018	**Asbestos Level Screen**	NAD
18/5775	1	BH05	1.80-2.25	6	24/04/2018	**General Description (Bulk Analysis)**	Soil/Stone
					24/04/2018	**Asbestos Fibres**	NAD
					24/04/2018	**Asbestos Fibres (2)**	NAD
					24/04/2018	**Asbestos ACM**	NAD
					24/04/2018	**Asbestos ACM (2)**	NAD
					24/04/2018	**Asbestos Type**	NAD
					24/04/2018	**Asbestos Type (2)**	NAD
					24/04/2018	**Asbestos Level Screen**	NAD

Client Name: AECOM
Reference: 60569745
Location: VP1 (TLOR)
Contact: Alex Freeman

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	NDP Reason
18/5166	1	BH01	0.45-0.70	4-6	Asbestos detected in sample
18/5166	1	WS01	1.00-1.25	13-15	Asbestos detected in sample
18/5384	1	TP06	0.40-0.60	1-3	Asbestos detected in sample
18/5384	1	TP01	0.70-0.90	7-9	Asbestos detected in sample
18/5384	1	TP02	0.30-0.50	13-15	Asbestos detected in sample
18/5455	1	BH02	0.60-1.00	1-3	Asbestos detected in sample

Notification of Deviating Samples

Client Name: AECOM

Reference: 60569745

Location: VP1 (TLOR)

Contact: Alex Freeman

Matrix : Liquid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
AB	x10 Dilution

JE Job No: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				

JE Job No: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				

JE Job No: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM37	Modified methods USEPA 160.2, EN872:2005 and SMWW 2540D. Gravimetric determination of Total Suspended Solids. Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			

JE Job No: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM60	As received solid samples are extracted with deionised water in a 2:1 ratio of water to solid.			AR	Yes
TM48	Determination of Ferrous Iron by reaction with Sodium Carbonate and Morfamquat Sulphate which is analysed spectrophotometrically.	PM0	No preparation is required.				
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes	Yes	AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AR	Yes

JE Job No: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes

JE Job No: 18/7222 18/5333 18/5166 18/5455 18/5775 18/5384

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	NONE	No Method Code				
NONE	No Method Code	NONE	No Method Code			AR	Yes
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Appendix E Gas and Groundwater Monitoring Results

	Ground Water Monitoring 11/05/18							
Hole ID	Depth to base (m)	Depth to water (m)	Height of well casing from ground level (m)	pH	Temperature (°C)	Specific Conductivity (µS/cm)	RDO concentration (mg/L)	ORP (mV)
WS01	2.57	2.16	0.35	-	-	-	-	-
WS02	1.46	1.37	1.57	-	-	-	-	-
WS03	3.8	1.4	0.29	8.92	10.08	3247.9	0.05	-42
WS04	1.88	0.99	0.37	8.97	11.48	5176.8	0.02	-16.1
WS05	4.38	1	0.28	8.63	10.97	3124.5	0.16	-66.9
WS06	3.75	1.59	0.25	9.07	10.83	1359.6	0.05	-110.2
WS07	3.74	1.83	0.44	9.29	11.5	1302.9	1.18	-70.6
WS08	4.55	3.86	0.4	-	-	-	-	-
BH01	14.82	3.97	0.28	9.17	11.62	751.68	2.32	107.3
BH02	15.26	2.87	0.42	8.46	17.55	424.14	2.22	37.9
BH03	28.91	2.75	0.3	9.11	12.86	692.92	0.35	-36.9
BH04	>30	1.56	-	-	-	-	-	-
BH05	17.91	2.04	-	-	-	-	-	-
BH06	>30	2.33	0.45	-	-	-	-	-

			Gas monitoring 11/05/18						
Hole ID	Pressure (mb)	Peak Flow (L/hr)	Steady Flow(L/hr)	CO_2 peak (%)	CO_2 stable (%)	O_2 minium (%)	O_2 stable (%)	CH_4 peak (%)	CH_4 stable (%)
WS01	1011	0	0	1	0.7	19.6	19.6	0	0
WS02	1012	0	0	0.4	0.1	20.1	20.2	0	0
WS03	1012	0	0	0.1	0.1	20.5	20.5	0	0
WS04	1012	0	0	0.2	0.2	20.2	20.4	0	0
WS05	1012	0	0	0	0	20.7	20.7	0	0
WS06	1017	0	0	0.1	0.1	20.6	20.7	0	0
WS07	1016	0.4	0.2	0.4	0.2	20.6	20.9	0	0
WS08	1017	4.8	0	0.7	0.5	20.4	20.6	0	0
BH01	1012	0	0	0.4	0.2	20.1	20.3	0	0
BH02	1012	0	0	0.2	0.2	20.5	20.5	0	0
BH03	*	*	*	*	*	*	*	*	*
BH04	1017	0	0	0.1	0.1	20.7	20.7	0	0
BH05	1017	0	0	0.4	0.1	20.1	20.5	0	0
BH06	1017	0	0	0.1	0.1	20.6	20.9	0	0

Note:
Pressure in the morning 1011, peaking at 1017 with the last recording of 1016 taken at the end of the day.
Measurements taken from top of well casing.
Well BH04 and 06 were too deep for the interface probe (30m)
Gas readings for BH03 absent due to gas tap being off
Gas tap dropped down well side of WS08
Water samples from WS06 were very silty and the hole began to run dry during sampling
WS07 ran dry before sampling could take palce
Duplicate water sample of BH03 collected

	Ground Water Monitoring 23/05/18		Gas monitoring 23/05/18								
Hole ID	Depth to water (m)	Depth to base (m)	Pressure (mb)	Peak Flow (L/hr)	Steady Flow(L/hr)	CO_2 peak (%)	CO_2 stable (%)	O_2 minium (%)	O_2 stable (%)	CH_4 peak (%)	CH_4 stable (%)
WS01	2.085	2.475	1025	0	0	0.1	0.1	20.3	20.3	0	0
WS02	1.32	1.465	1026	-17	0	3.9	0.1	14.4	20.3	0	0
WS03	1.525	3.72	1025	7.3	0	0.3	0.2	20.3	20.3	0	0
WS04	0.96	1.7	1026	0	0	0.1	0.1	20.3	20.3	0	0
WS05	0.98	4.165	1026	0	0	0.1	0.1	20.3	20.3	0	0
WS06	1.61	3.62	1025	0	0	0.2	0.1	20.3	20.4	0	0
WS07	1.835	3.61	1025	0	0	0.4	0.1	20.2	20.3	0	0
WS08	3.485	4.5	1026	4.8	0	0.2	0	20.4	20.4	0	0
BH01	3.705	14.265	1026	5.3	0	0.6	0.4	19.8	19.9	0	0
BH02	2.66	15.13	1025	0	0	0.1	0.1	20.4	20.4	0	0
BH03	2.57	28.84	1026	0	0	0.8	0.1	20.3	20.4	0	0
BH04	1.31	35.03	1025	0	0	0.1	0.1	20.3	20.3	0	0
BH05	1.865	17.795	1026	0	0	0.2	0.1	20.3	20.3	0	0
BH06	2.195	35.03	1025	0	0	0.1	0.1	20.4	20.4	0	0

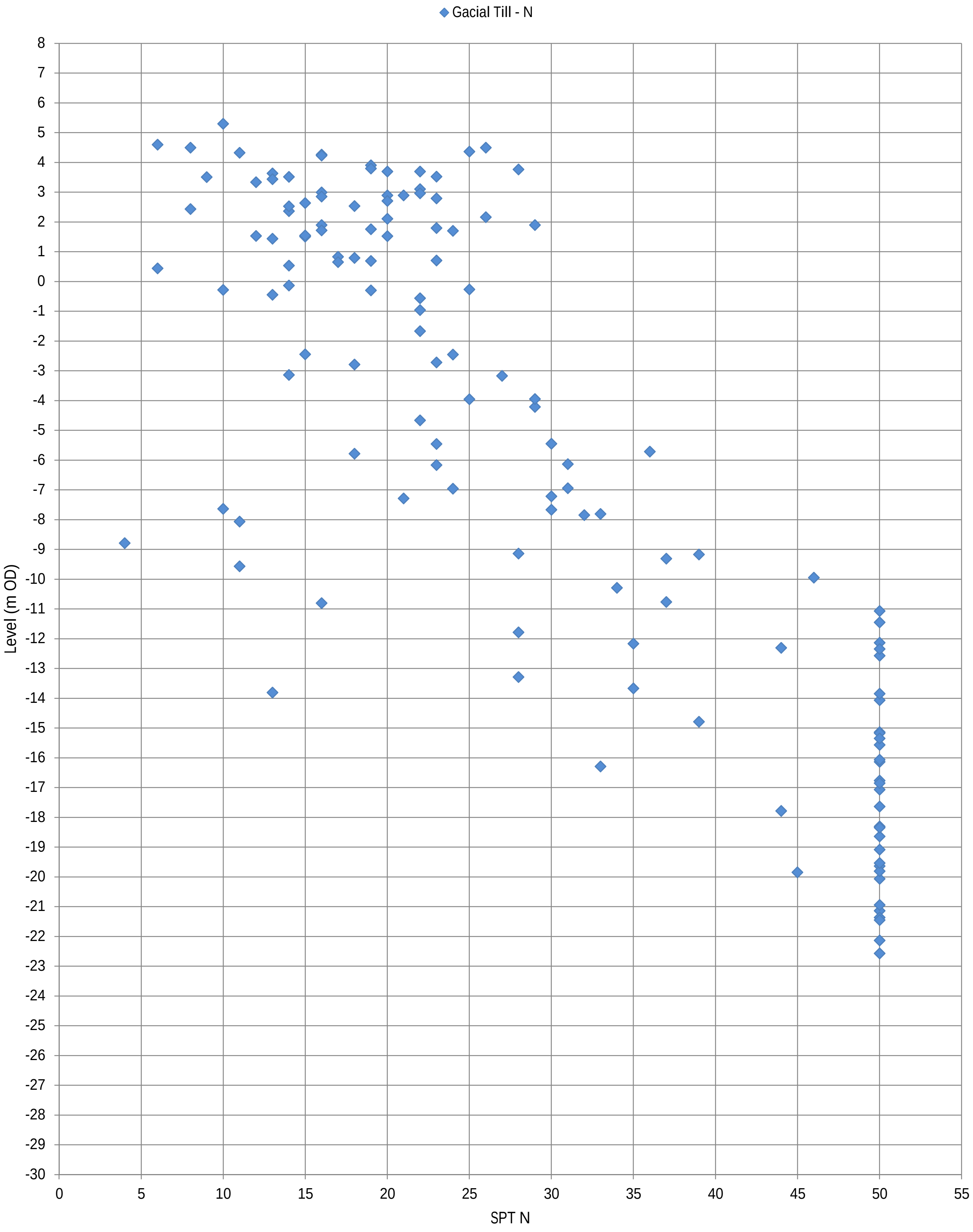
Note:
Pressure in the morning 1026, peaking at 1026 with the last recording of 1026 taken at the end of the day.
Measurements taken from top of well casing.
Gas readings from WS02 fluctuated a lot, up and down by approximately 6% for a while before it stabilsed
New gas tap placed on WS08

	Ground Water Monitoring 01/06/18		Gas monitoring 01/06/18								
Hole ID	Depth to water (m)	Depth to base (m)	Pressure (mb)	Peak Flow (L/hr)	Steady Flow(L/hr)	CO_2 peak (%)	CO_2 stable (%)	O_2 minium (%)	O_2 stable (%)	CH_4 peak (%)	CH_4 stable (%)
WS01	2.11	2.491	1018	0	0	0.5	0.2	20.2	20.4	0	0
WS02	1.367	1.451	1018	0	0	1.3	0.1	19.4	20.6	0	0
WS03	1.482	3.703	1018	5.4	0	0.3	0.3	20.4	20.6	0	0
WS04	0.967	1.676	1018	0	0	0.1	0.1	20.6	20.6	0	0
WS05	1.03	4.417	1017	0	0	0.1	0.1	20.4	20.4	0	0
WS06	1.64	3.622	1017	0	0	0.1	0.1	20.7	20.7	0	0
WS07	1.866	3.599	1017	0	0	0.1	0.1	20.7	20.8	0	0
WS08	3.332	4.5	1016	1.3	0	0.5	0	20.7	20.8	0	0
BH01	3.783	14.285	1018	-1	0	0.7	0.5	19.9	20	0	0
BH02	2.775	15.182	1017	0	0	0.1	0.1	20.6	20.7	0	0
BH03	2.656	28.915	1017	6	0	0.1	0.1	20.4	20.7	0	0
BH04	1.438	35.033	1016	0	0	0.1	0	20.7	20.8	0	0
BH05	1.955	17.838	1016	0	0	0	0	20.7	20.7	0	0
BH06	2.271	34.99	1017	0	0	0.1	0.1	20.7	20.8	0	0

Note:
Pressure in the morning 1018, peaking at 1026 with the last recording of 1016 taken at the end of the day.
Measurements taken from top of well casing.

Appendix F Parametric Study Charts

- A.1 – SPT N Value vs Elevation for Glacial Deposits
- A.2 – Hand Vane Shear Strength Value vs Elevation for Made Ground
- A.3 – Undrained Shear Strength Value vs Elevation for Glacial Deposits
- A.4 – Plasticity Chart for Made Ground
- A.5 – Plasticity Chart for Glacial Deposits
- A.6 – Plasticity Index value vs Elevation for Glacial Deposits
- A.7 – Plasticity Index value vs Elevation for Made Ground
- A.8 – pH Value vs Depth for Superficial Materials (MG and GT)
- A.9 – SO4 (H2O Sol) vs Depth for Superficial Materials (MG and GT)
- A.10 – SO4 (Acid Sol) vs Depth for Superficial Materials (MG and GT)
- A.11 – Total Sulfur (%) vs Depth for Superficial Materials (MG and GT)



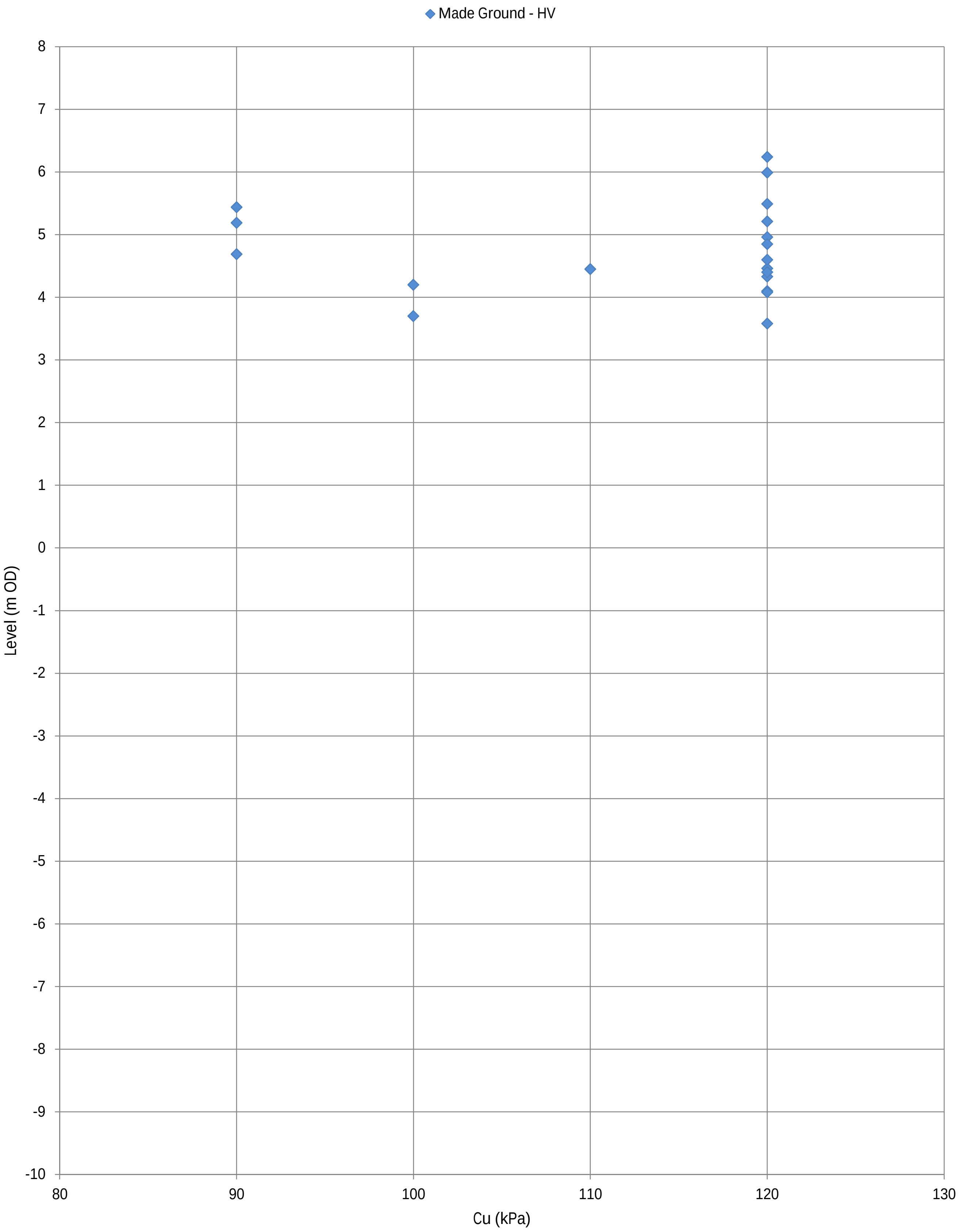
SPT N Value vs Elevation

Geological Units: Glacial Deposits (Slightly Sandy Slightly Gravelly Clay)

Figure A.1

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

AECOM



Hand Vane Shear Strength Value vs Elevation

Geological Units: Cohesive Made Ground

Figure A.2

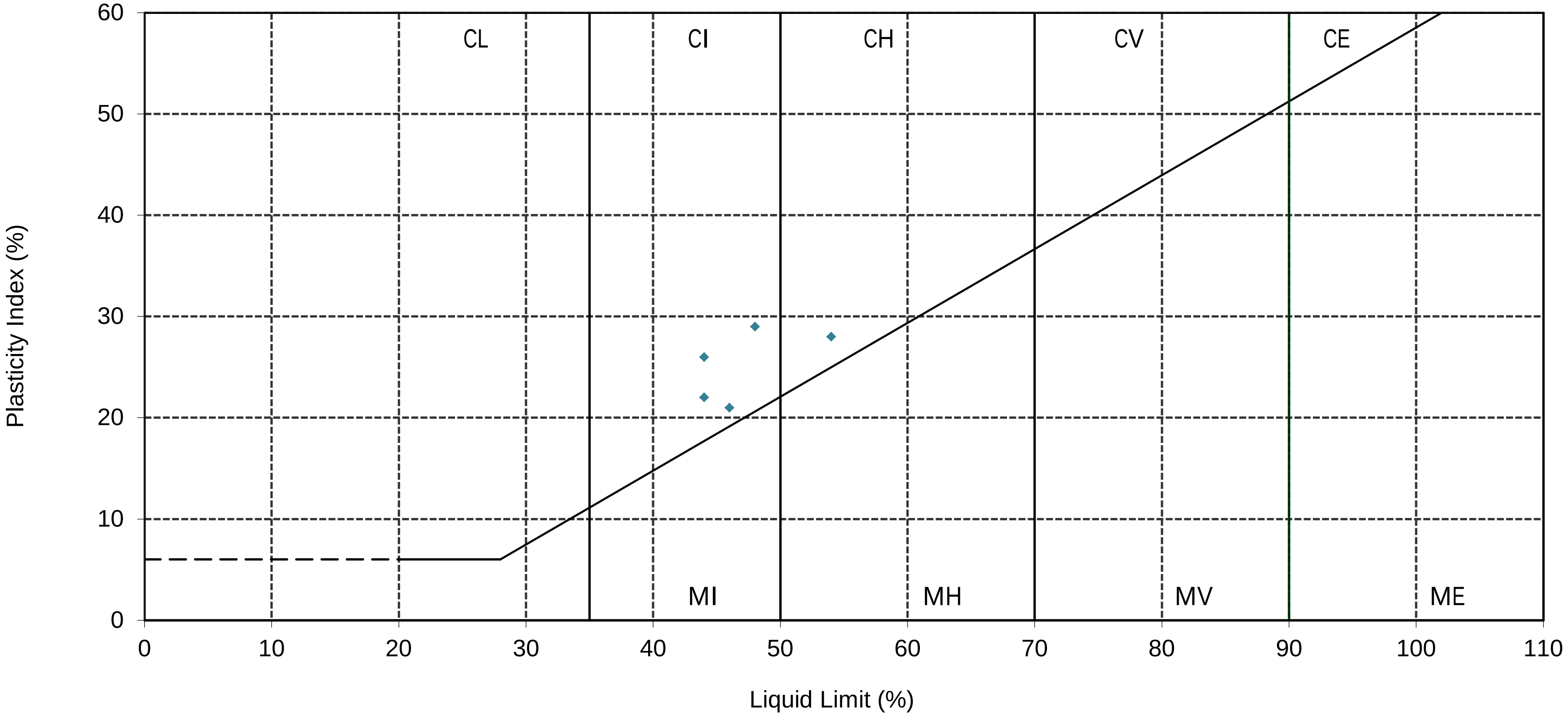
Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

Undarained Shear Strength Value vs Elevation

Geological Units: Glacial Till (Slightly Sandy Slightly Gravelly Clay)	**Figure A.3**

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

AECOM



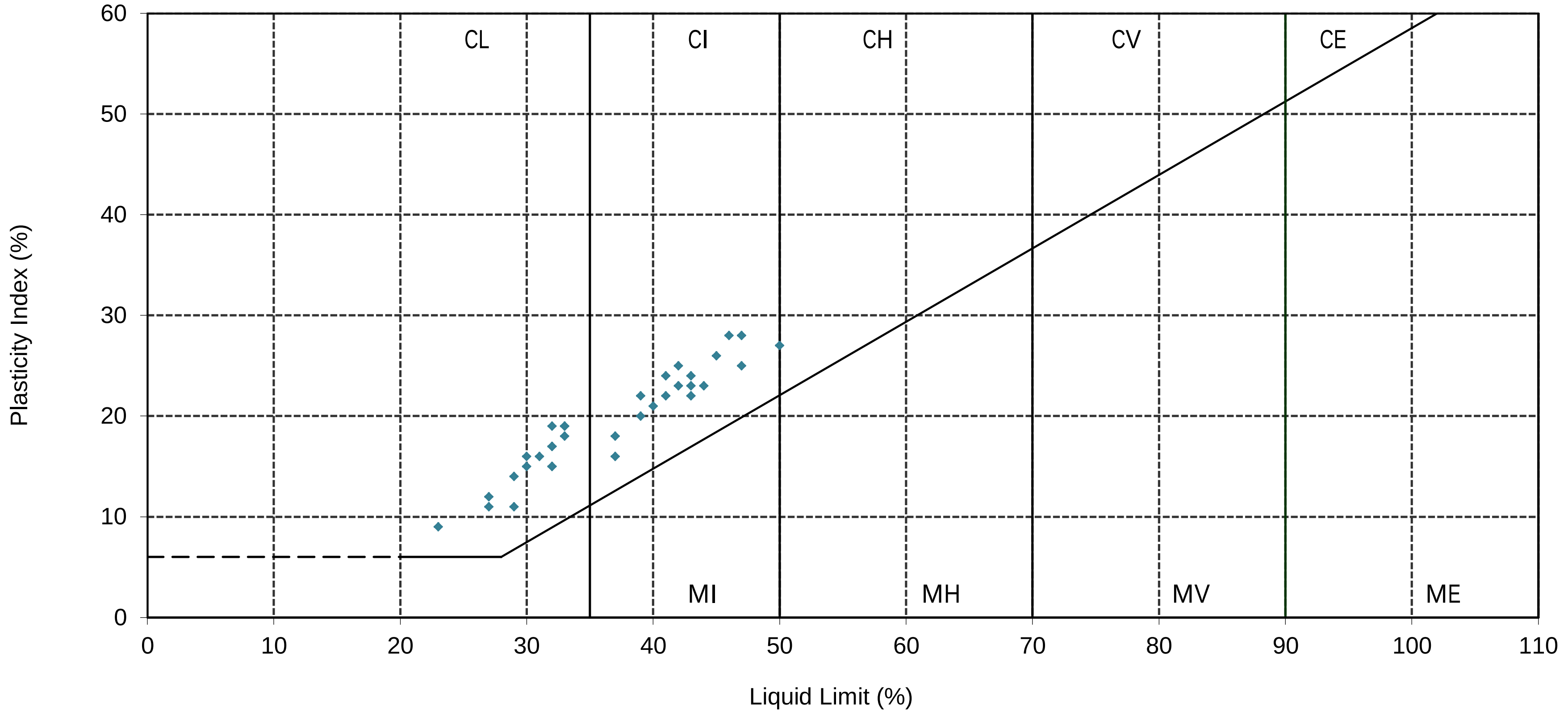
Plasticity Chart

Geological Unit: Cohesive Made Ground

Figure A.4

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

AECOM



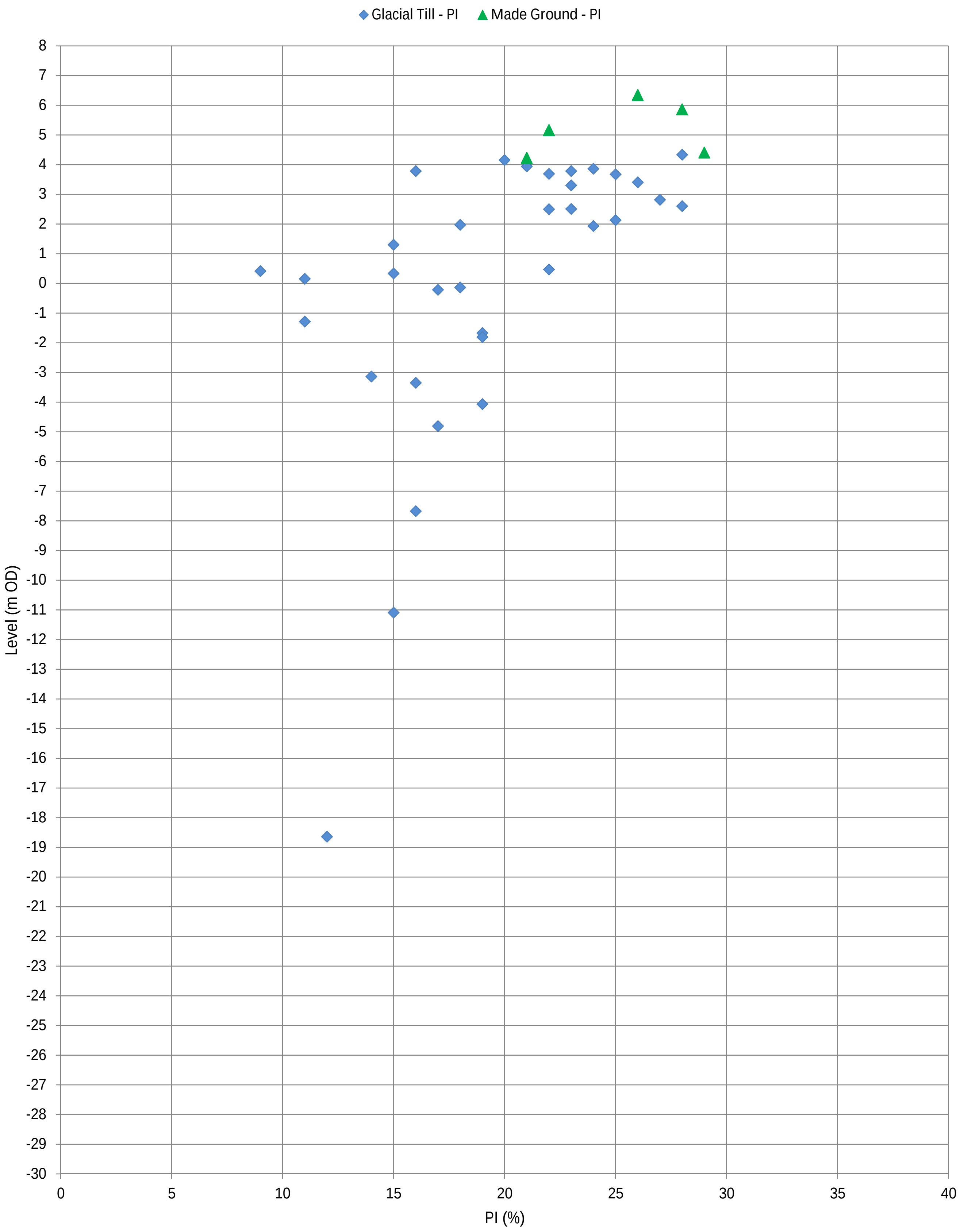
Plasticity Chart

Geological Unit: Glacial Till (Slightly Sandy Slightly Gravelly Clay)

Figure A.5

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

AECOM



Plasticity Index vs Elevation

Geological Units: Glacial Till (Slightly Sandy Slightly Gravelly Clay) Cohesive Made Ground	**Figure A.6**

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

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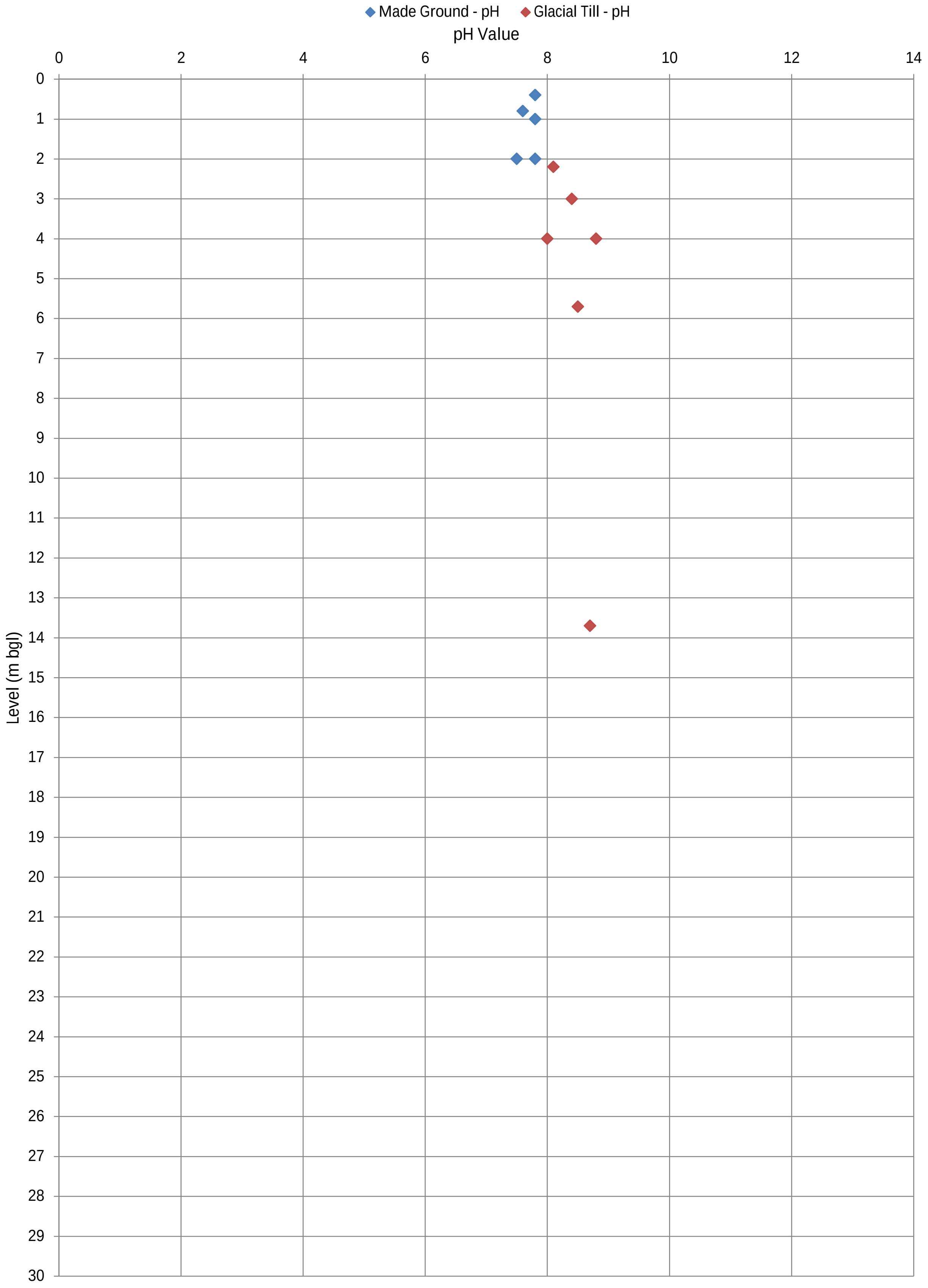

pH Value vs Depth

Geological Units: Glacial Till (Slightly Sandy Slightly Gravelly Clay)
Cohesive Made Ground

Figure A.7

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

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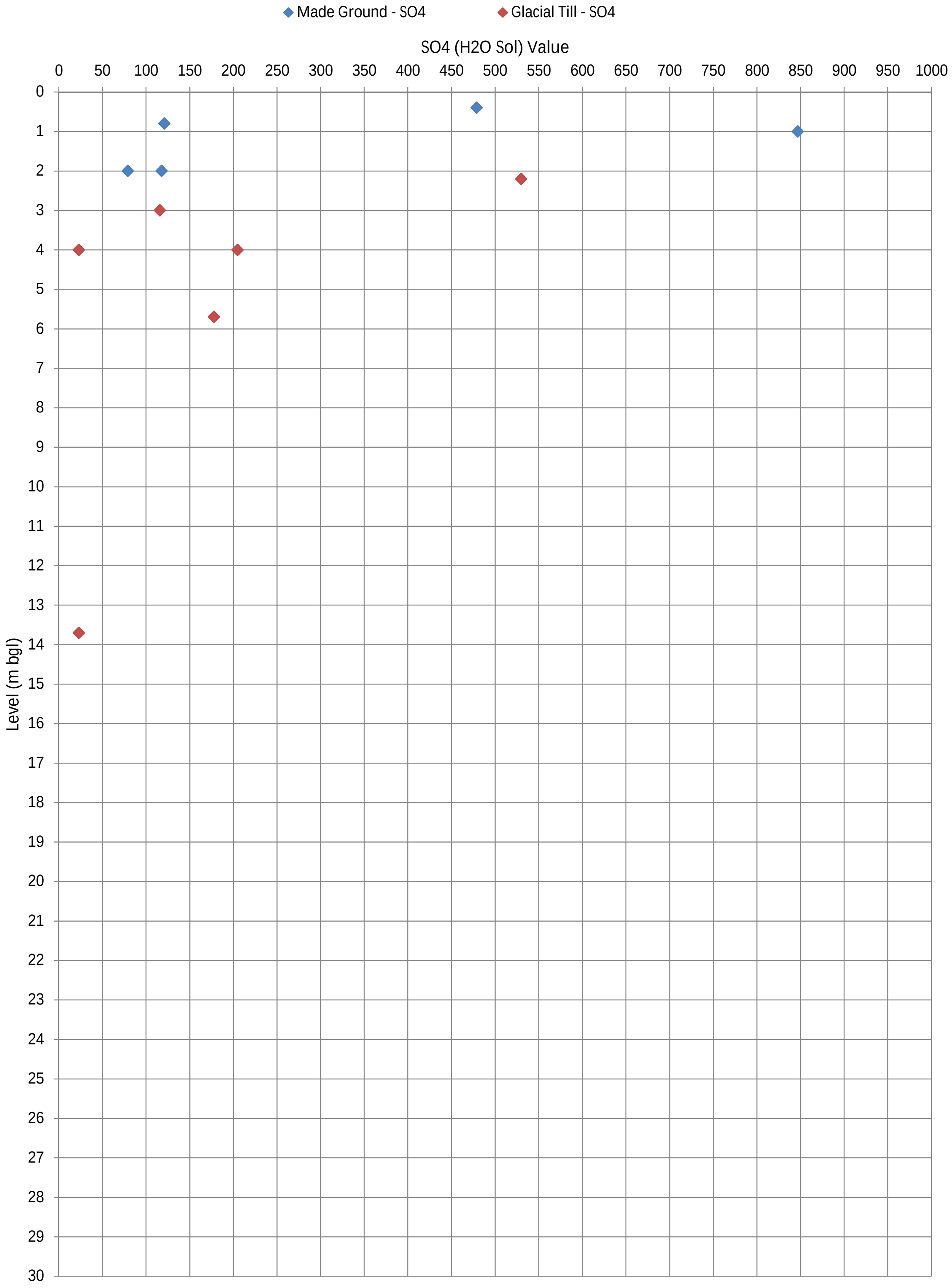
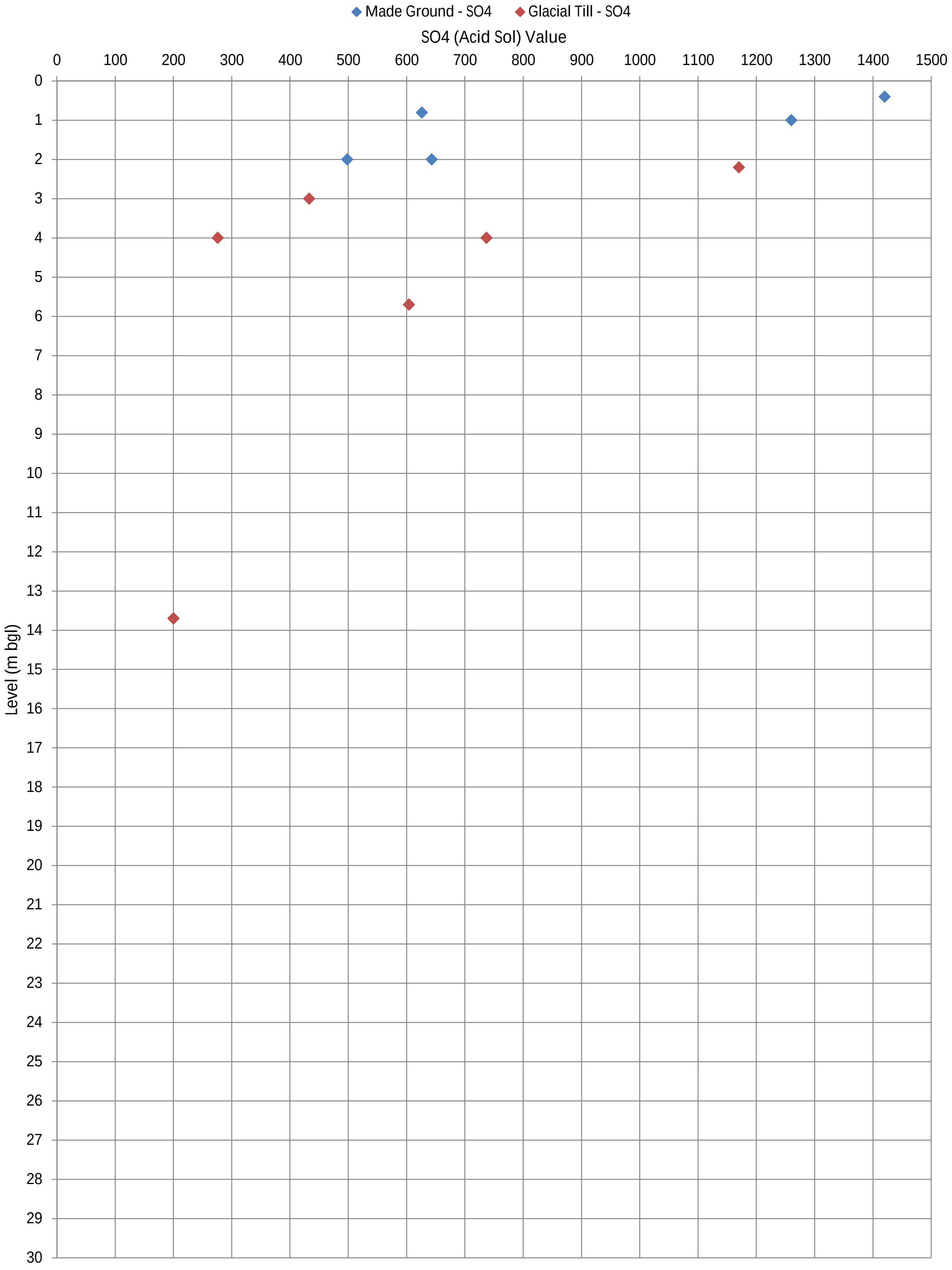


SO4 (H2O Sol) vs Depth

Geological Units: Glacial Till (Slightly Sandy Slightly Gravelly Clay)
Cohesive Made Ground

Figure A.8

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International



SO4 (Acid Sol) vs Depth

Geological Units: Glacial Till (Slightly Sandy Slightly Gravelly Clay) Cohesive Made Ground	**Figure A.9**

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

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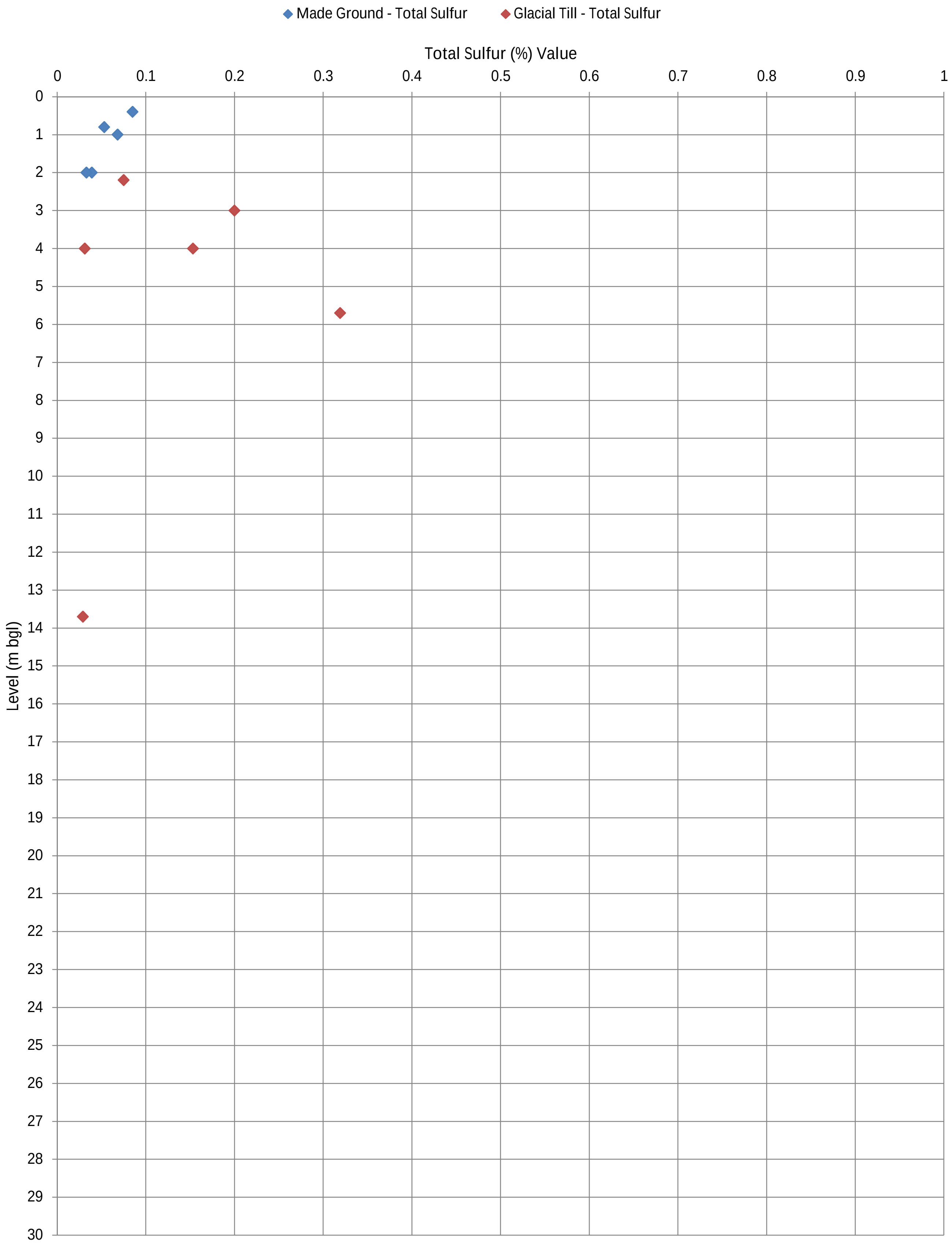

Total Sulfur (%) vs Depth

Geological Units: Glacial Till (Slightly Sandy Slightly Gravelly Clay)
Cohesive Made Ground

Figure A.10

Project Number:	60569745
Project Title:	VPI Immingham Energy Park
Client:	Vitol Power International

AECOM

Appendix G Contamination Assessments

Human Health Soils Risk Assessment

Analyte	Human Health GAC	Controlled waters GAC		I.D.	BH01	BH02	BH03	BH04	BH05	BH06	TP01	TP02	TP04	TP05	TP06	TP07	TP08	TP09	TP10	TT01	TT02	TT03	WS01	WS02	WS03	WS04	WS05	WS06	WS07	WS08
		Drinking Water Standard	Coastal Environmental Quality Standard	Depth (m)	0.575	0.8	1.75	0.85	2.025	0.55	0.8	0.4	0.9	0.6	0.5	1.45	0.35	0.35	0.5	1.8	0.85	0.7	1.125	0.25	0.6	0.5	0.75	0.6	0.55	0.6
				Date	05/04/2018	11/04/2018	10/04/2018	16/04/2018	17/04/2018	05/04/2018	11/04/2018	11/04/2018	10/04/2018	10/04/2018	10/04/2018	09/04/2018	09/04/2018	09/04/2018	06/04/2018	09/04/2018	06/04/2018	06/04/2018	06/04/2018	10/04/2018	10/04/2018	06/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018
VOC																														
1,1,1,2-tetrachloroethane	120[#18]	**0.00205**[#10]			<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
1,1,2,2-tetrachloroethane	260[#18]	**0.0000865**[#10]			**0.263**	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
1,1-dichloropropene					<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
1,2,3-trichloropropane	0.11[#11]	**7.61E-7**[#10]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
1,2,4-trimethylbenzene	46.6[#19]	**0.794**[#10]			0.315	0.091	-	-	<0.006	-	0.606	**0.833**	-	-	<0.006	-	-	-	-	-	-	-	0.111	<0.006	<0.006	-	<0.006	-	-	-
1,2-dibromo-3-chloropropane	0.064[#11]	**0.000749**[#3]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
1,2-dichloroethane	0.42[#18]	**0.000729**[#1]	*0.00243*[#8]		<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
1,2-Dichloroethene		**0.0208**[#3]			<0.01	0.005	-	-	0.005	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.01	0.005	0.005	-	0.005	-	-	-
1,2-dichloropropane	2.65[#19]	**0.0225**[#3]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
1,3,5-trimethylbenzene	1.500[#11]	**0.448**[#10]			0.02	<0.003	-	-	<0.003	-	0.044	0.051	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
1,3-dichloropropane	23.000[#11]	**0.216**[#10]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
2,2-dichloropropane					<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Bromochloromethane	630[#11]	**0.028**[#10]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Bromodichloromethane	1.3[#11]	**0.0392**[#1]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Bromoform	730[#19]	**0.0392**[#1]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Chlorodibromomethane	39[#11]	**0.0392**[#1]			<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
cis-1,3-dichloropropene					<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Cyclohexane, 1,1,3-trimethyl-					-	-	-	-	-	-	-	4.705	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane, ethyl-					-	-	-	-	-	-	-	2.325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	99[#11]	**0.00365**[#10]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Dodecane, 2,6,10-trimethyl-					-	-	-	-	-	-	2.465	7.253	-	-	-	-	-	-	-	-	-	-	1.528	-	-	-	-	-	-	-
Hexachlorobutadiene	33[#18]	**0.011**[#1]	*0.0658*[#7]		<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Isopropylbenzene	1.540[#19]	**5.2**[#10]			0.024	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
Naphthalene, decahydro-2-methyl-					0.876	-	-	-	-	-	0.292 - 2.269	1.088	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
n-butylbenzene	58.000[#11]	**35.5**[#10]			<0.004	<0.004	-	-	<0.004	-	0.063	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
n-propylbenzene	4.530[#19]	**8.16**[#10]			0.056	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
p-isopropyltoluene					0.092	<0.004	-	-	<0.004	-	0.075	1.185	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
sec-butylbenzene	120.000[#11]	**126**[#10]			0.203	<0.004	-	-	<0.004	-	0.05	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Styrene	3.550[#19]	**0.0657**[#3]	*0.164*[#13]		<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
tert-butylbenzene	120.000[#11]	**18.6**[#10]			<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
trans-1,3-dichloropropene					<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
trans-Decalin, 2-methyl-					-	-	-	-	-	-	0.357 - 1.05	0.246 - 2.398	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trihalomethanes		**0.0392**[#1]			<0.018	0.009	-	-	0.009	-	<0.018	<0.018	-	-	<0.018	-	-	-	-	-	-	-	<0.018	0.009	0.009	-	0.009	-	-	-
Chlorinated Hydrocarbons																														
1,1,1-trichloroethane	640[#18]	**2.8**[#3]	*0.14*[#13]		<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
1,1,2-trichloroethane	89.7[#19]	**0.000312**[#10]	*0.334*[#13]		<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
1,1-dichloroethane	208[#19]	**0.00115**[#10]			<0.006	<0.006	-	-	<0.006	-	<0.006	<0.006	-	-	<0.006	-	-	-	-	-	-	-	<0.006	<0.006	<0.006	-	<0.006	-	-	-
1,1-dichloroethene	22.6[#19]	**0.11**[#3]			<0.006	<0.006	-	-	<0.006	-	<0.006	<0.006	-	-	<0.006	-	-	-	-	-	-	-	<0.006	<0.006	<0.006	-	<0.006	-	-	-
Carbon tetrachloride	3[#18]	**0.0077**[#1]	*0.0308*[#8]		<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Chloroethane	640[#19]	**5.89**[#10]			<0.006	<0.006	-	-	<0.006	-	<0.006	<0.006	-	-	<0.006	-	-	-	-	-	-	-	<0.006	<0.006	<0.006	-	<0.006	-	-	-
Chloroform	81[#18]	**0.0392**[#1]	*0.00138*[#8]		<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
Chloromethane	0.573[#19]	**0.0271**[#10]			<0.003	0.005	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
cis-1,2-dichloroethene	11.3[#19]	**0.0208**[#3]			<0.007	<0.007	-	-	<0.007	-	<0.007	<0.007	-	-	<0.007	-	-	-	-	-	-	-	<0.007	<0.007	<0.007	-	<0.007	-	-	-
Dichloromethane	162[#19]	**0.00371**[#3]	*0.00371*[#8]		<0.03	<0.03	-	-	<0.03	-	***0.078***	***0.041***	-	-	<0.03	-	-	-	-	-	-	-	<0.03	<0.03	<0.03	-	<0.03	-	-	-
PCE+TCE+DCE+VC					<0.026	0.013	-	-	0.013	-	<0.026	<0.026	-	-	<0.026	-	-	-	-	-	-	-	<0.026	0.013	0.013	-	0.013	-	-	-
Sum of PCE and TCE					<0.008	0.004	-	-	0.004	-	<0.008	<0.008	-	-	<0.008	-	-	-	-	-	-	-	<0.008	0.004	0.004	-	0.004	-	-	-
TCE+DCE+VC					<0.023	0.0115	-	-	0.0115	-	<0.023	<0.023	-	-	<0.023	-	-	-	-	-	-	-	<0.023	0.0115	0.0115	-	0.0115	-	-	-
Tetrachloroethene	19[#18]		*0.0277*[#8]		<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
trans-1,2-dichloroethene	18.9[#19]	**0.0208**[#3]			<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
Trichloroethene	1.2[#18]		*0.0148*[#8]		<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	-	<0.005	-	-	-
Vinyl chloride	0.04[#18]	**0.000148**[#1]			<0.002	<0.002	-	-	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	-	<0.002	-	-	-
Halogenated Benzenes																														
1,2,3-trichlorobenzene	110[#18]	**0.00257**[#1]			<0.007	<0.007	-	-	<0.007	-	<0.007	<0.007	-	-	<0.007	-	-	-	-	-	-	-	<0.007	<0.007	<0.007	-	<0.007	-	-	-
1,2,4-trichlorobenzene	240[#18]	**0.0023**[#1]			<0.007	<0.007	-	-	<0.007	-	<0.007	<0.007	-	-	<0.007	-	-	-	-	-	-	-	<0.007	<0.007	<0.007	-	<0.007	-	-	-
1,2-dichlorobenzene	2.200[#18]	**6.96**[#3]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.01 - 0.926	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
1,3-dichlorobenzene	34[#18]				<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
1,4-dichlorobenzene	4.800[#18]	**2.14**[#3]			<0.004	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
2-chlorotoluene	23.000[#11]	**1.79**[#10]			<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
4-chlorotoluene	23.000[#11]	**2.43**[#10]			<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
Bromobenzene	105[#19]	**0.208**[#10]			<0.002	<0.002	-	-	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	-	<0.002	-	-	-
Chlorobenzene	59[#18]	**0.769**[#3]			**<0.004 - 1.372**	<0.004	-	-	<0.004	-	<0.004	<0.004	-	-	<0.004	-	-	-	-	-	-	-	<0.004	<0.004	<0.004	-	<0.004	-	-	-
Hexachlorobenzene	110[#18]	**0.0339**[#1]	*0.0169*[#7]		<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Trichlorobenzene (total)					<0.014	0.007	-	-	0.007	-	<0.014	<0.014	-	-	<0.014	-	-	-	-	-	-	-	<0.014	0.007	0.007	-	0.007	-	-	-
Halogenated Hydrocarbons																														
1,2-dibromoethane	0.16[#11]	**0.000193**[#3]			<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
Bromomethane	30[#11]	**0.00132**[#10]			<0.001	<0.001	-	-	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-	-	-
Dichlorodifluoromethane	370[#11]	**0.436**[#10]			<0.002	<0.002	-	-	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	-	<0.002	-	-	-
Trichlorofluoromethane	350.000[#11]	**4.1**[#10]			<0.003	<0.003	-	-	<0.003	-	<0.003	<0.003	-	-	<0.003	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	-	<0.003	-	-	-
PAH																														
Acenaphthene	90.000[#18]	**0.423**[#17]			<0.1	<0.1	-	-	<0.01	-	<0.01	**1.651**	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Acenaphthylene	90.000[#18]	**0.328**[#17]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Anthracene	530.000[#18]	**5.06**[#17]	*0.00563*[#8]		<0.1	<0.1	-	-	<0.01	-	*0.603*	*1.072*	-	-	*0.05*	-	-	-	-	-	-	-	<0.1	<0.01	*0.046*	-	*0.041*	-	-	-
Benz(a)anthracene	170[#18]	**2.72**[#17]			<0.1	<0.1	-	-	<0.01	-	0.662	1.52	-	-	0.072	-	-	-	-	-	-	-	<0.1	<0.01	0.089	-	0.056	-	-	-
Benzo(a) pyrene	36[#18]	**0.0129**[#1]	*0.000219*[#8]		<0.1	<0.1	-	-	<0.01	-	***0.938***	***1.089***	-	-	***0.096***	-	-	-	-	-	-	-	<0.1	<0.01	***0.089***	-	***0.105***	-	-	-
Benzo(b)&(k)fluoranthene					<0.1	<0.1	-	-	<0.01	-	0.796	1.19	-	-	0.158	-	-	-	-	-	-	-	<0.1	<0.01	0.18	-	0.159	-	-	-
Benzo(b)fluoranthene	45[#18]		*0.0178*[#7]		<0.1	<0.1	-	-	<0.01	-	*0.573*	*0.857*	-	-	*0.114*	-	-	-	-	-	-	-	<0.1	<0.01	*0.13*	-	*0.114*	-	-	-
Benzo(g,h,i)perylene	4.000[#18]		*0.00342*[#7]		<0.1	<0.1	-	-	<0.01	-	*0.581*	*0.591*	-	-	*0.105*	-	-	-	-	-	-	-	<0.1	<0.01	*0.114*	-	*0.104*	-	-	-
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene					<0.2	0.1	-	-	0.01	-	0.818	0.854	-	-	0.145	-	-	-	-	-	-	-	<0.2	0.01	0.151	-	0.151	-	-	-
Benzo(k)fluoranthene	1.200[#18]		*0.0251*[#7]		<0.1	<0.1	-	-	<0.01	-	*0.223*	*0.333*	-	-	*0.044*	-	-	-	-	-	-	-	<0.1	<0.01	*0.05*	-	*0.045*	-	-	-
Chrysene	350[#18]	**3.85**[#17]			<0.1	<0.1	-	-	<0.01	-	2.415	3.179	-	-	0.258	-	-	-	-	-	-	-	<0.1	<0.01	0.318	-	0.288	-	-	-
Dibenz(a,h)anthracene	3.6[#18]	**0.13**[#17]			<0.1	<0.1	-	-	<0.01	-	**0.255**	**0.346**	-	-	0.05	-	-	-	-	-	-	-	<0.1	<0.01	0.04	-	0.038	-	-	-
Fluoranthene	23.000[#18]	**0.728**[#3]	*0.00115*[#8]		<0.1	<0.1	-	-	<0.01	-	<0.01	***1.569***	-	-	*0.023*	-	-	-	-	-	-	-	<0.1	<0.01	*0.026*	-	*0.029*	-	-	-
Fluorene	66.000[#18]	**0.339**[#17]			<0.1	<0.1	-	-	<0.01	-	<0.01	**2.305**	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Indeno(1,2,3-c,d)pyrene	510[#18]				<0.1	<0.1	-	-	<0.01	-	0.237	0.263	-	-	0.04	-	-	-	-	-	-	-	<0.1	<0.01	0.037	-	0.047	-	-	-
Naphthalene	220[#18]	**0.039**[#17]	*0.013*[#8]		<0.027	<0.027	-	-	<0.01	-	***0.066 - 0.601***	***0.252 - 1.36***	-	-	<0.01	-	-	-	-	-	-	-	<0.027	<0.01	<0.01	-	<0.01	-	-	-
PAHs (sum of 4)					<0.4	0.2	-	-	0.02	-	1.614	2.044	-	-	0.303	-	-	-	-	-	-	-	<0.4	0.02	0.331	-	0.31	-	-	-
Phenanthrene	22.000[#18]	**0.22**[#17]			<0.1	<0.1	-	-	<0.01	-	**1.872**	**7.6**	-	-	0.11	-	-	-	-	-	-	-	<0.1	<0.01	0.13	-	0.124	-	-	-
Pyrene	54.000[#18]	**1.46**[#17]			<0.1	**2.817**	-	-	<0.01	-	**2.469**	**4.18**	-	-	0.091	-	-	-	-	-	-	-	<0.1	<0.01	0.11	-	0.171	-	-	-
Phenolics																														
2,4-dimethylphenol	20.000[#19]	**0.961**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2-chloronaphthalene	460[#19]	**15.7**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2-methylphenol	41.000[#11]	**1.55**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2-nitrophenol					<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
4-chloro-3-methylphenol	82.000[#11]				<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
4-methylphenol	82.000[#11]	**3.02**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
4-nitrophenol					<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Phenol	620[#18]	**1.91**[#10]	*0.00253*[#6]		<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Halogenated Phenols																														
2,4,5-trichlorophenol	82.000[#11]	**21.4**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2,4,6-trichlorophenol	210[#11]	**0.612**[#3]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2,4-dichlorophenol	2.500[#11]	**0.0668**[#10]	*0.00061*[#6]		<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2-chlorophenol	5.800[#11]	**0.35**[#10]	*0.192*[#13]		<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Pentachlorophenol	400[#18]	**0.0476**[#3]	*0.00212*[#8]		<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Phthalates																														
Bis(2-ethylhexyl) phthalate	85.800[#19]	**0.44**[#3]	*0.0715*[#8]		<1	<1	-	-	<0.1	-	***1.926***	***3.119***	-	-	<0.1	-	-	-	-	-	-	-	<1	<0.1	<0.1	-	<0.1	-	-	-
Butyl benzyl phthalate	944.000[#19]	**0.306**[#10]	*0.0143*[#6]		<1	<1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<1	<0.1	<0.1	-	<0.1	-	-	-
Di-n-butyl phthalate	15.400[#19]	**15.7**[#10]	*0.139*[#13]		<1	<1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<1	<0.1	<0.1	-	<0.1	-	-	-
Di-n-octyl phthalate	89.100[#19]	**148**[#10]	*14.8*[#13]		<1	<1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<1	<0.1	<0.1	-	<0.1	-	-	-
Diethylphthalate	182.000[#19]	**21.8**[#10]	*0.291*[#13]		<1	<1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<1	<0.1	<0.1	-	<0.1	-	-	-
Dimethyl phthalate			*0.599*[#13]		<1	<1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<1	<0.1	<0.1	-	<0.1	-	-	-
TICS																														
2-Bromododecane (TIC)					-	-	-	-	-	-	3.906	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Octane, 3-methyl-					-	-	-	-	-	-	-	1.413	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
288246-53-7					-	-	-	-	-	-	2.246	2.517	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptacosane					-	-	-	-	-	-	-	12.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH																														
>C5-C6 Aliphatics	3.300[#18]	**161**[#2]			<0.1	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	-	<0.1	-	-	-
>C6-C8 Aliphatics	9.200[#18]	**621**[#2]			<0.1	<0.1	-	-	<0.1	-	<0.1	1.3	-	-	<0.1	-	-	-	-	-	-	-	0.2	<0.1	<0.1	-	<0.1	-	-	-
>C8-C10 Aliphatics	2.500[#18]	**92.1**[#2]			1	<0.1	-	-	<0.1	-	0.3	5.6	-	-	<0.1	-	-	-	-	-	-	-	1.1	<0.1	<0.1	-	<0.1	-	-	-
>C10-C12 Aliphatics	12.000[#18]	**722**[#2]			588.8	23.2	-	-	<0.2	-	154.5	325.9	-	-	<0.2	-	-	-	-	-	-	-	51.8	<0.2	9.7	-	4.9	-	-	-
>C12-C16 Aliphatics	66.000[#18]	**16.100**[#2]			1,627	251	-	-	<4	-	789	925	-	-	<4	-	-	-	-	-	-	-	343	9	101	-	52	-	-	-
>C16-C21 Aliphatics		**1.890.000**[#2]			2,885	858	-	-	<7	-	1,715	1,534	-	-	<7	-	-	-	-	-	-	-	977	26	367	-	256	-	-	-
>C16-C35 Aliphatics	1.600.000[#18]				8,057	2,985	-	-	7	-	5,129	4,535	-	-	<14	-	-	-	-	-	-	-	3,500	108	1,243	-	931	-	-	-
>C21-C35 Aliphatics		**22.800.000**[#2]			5,172	2,127	-	-	<7	-	3,414	3,001	-	-	<7	-	-	-	-	-	-	-	2,523	82	876	-	675	-	-	-
>C5-C35 Aliphatics					10,274	3,259	-	-	<19	-	6,073	5,793	-	-	<19	-	-	-	-	-	-	-	3,896	117	1,354	-	988	-	-	-
>EC5-EC7 Aromatics	23.000[#18]	**0.000731**[#1]	*0.00584*[#8]		<0.1	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	-	<0.1	-	-	-
>EC7-EC8 Aromatics	58.000[#18]	**1.47**[#2]	*0.155*[#6]		<0.1	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	-	<0.1	-	-	-
>EC8-EC10 Aromatics	4.300[#18]	**4.78**[#2]			<0.1	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	-	<0.1	-	-	-
>EC10-EC12 Aromatics	19.000[#18]	**2.27**[#2]			**92.9**	<0.2	-	-	<0.2	-	**33.9**	**103.8**	-	-	<0.2	-	-	-	-	-	-	-	**10.3**	<0.2	<0.2	-	<0.2	-	-	-
>EC12-EC16 Aromatics	37.000[#18]	**4.51**[#2]			**809**	<4	-	-	<4	-	**358**	**688**	-	-	<4	-	-	-	-	-	-	-	**104**	<4	**37**	-	**32**	-	-	-
>EC16-EC21 Aromatics	28.000[#18]	**12.7**[#2]			**3,404**	<7	-	-	<7	-	**1,663**	**1,953**	-	-	<7	-	-	-	-	-	-	-	**629**	**17**	**357**	-	**322**	-	-	-
>EC21-EC35 Aromatics	28.000[#18]	**113**[#2]			**8,205**	40	-	-	<7	-	**5,036**	**5,372**	-	-	<7	-	-	-	-	-	-	-	**3,203**	**158**	**1,790**	-	**1,581**	-	-	-
>EC5-EC35 Aromatics					12,511	40	-	-	<19	-	7,091	8,117	-	-	<19	-	-	-	-	-	-	-	3,946	175	2,184	-	1,935	-	-	-
>C5-C35 Aliphatics & Aromatics					22,785	3,299	-	-	<38	-	13,164	13,910	-	-	<38	-	-	-	-	-	-	-	7,842	292	3,538	-	2,923	-	-	-
TPH Hazard Indicies	1				0	0	-	-	0	-	0	0	-	-	0	-	-	-	-	-	-	-	0	0	0	-	0	-	-	-
BTEX																														
Benzene	24[#18]	**0.000731**[#1]	*0.00584*[#8]		***0.046***	***0.028***	-	-	<0.005	-	***0.045 - 1.926***	***0.06 - 0.868***	-	-	<0.005	-	-	-	-	-	-	-	***0.047***	<0.005	<0.005	-	<0.005	-	-	-
Toluene	58.000[#18]	**1.47**[#3]	*0.155*[#6]		0.007	0.006	-	-	<0.003	-	0.005	0.019	-	-	<0.003	-	-	-	-	-	-	-	0.015	<0.003	<0.003	-	<0.003	-	-	-
Ethylbenzene	6.200[#18]	**1.36**[#3]	*0.0905*[#13]		0.06	0.024	-	-	<0.003	-	0.039	*0.121*	-	-	<0.003	-	-	-	-	-	-	-	0.031	<0.003	<0.003	-	<0.003	-	-	-
Xylene (m & p)					0.114	0.078	-	-	<0.004	-	0.213	0.115	-	-	<0.004	-	-	-	-	-	-	-	0.089	<0.004	0.009	-	<0.004	-	-	-
Xylene Total	6.400[#18]	**2.29**[#3]	*0.138*[#13]		*0.15*	0.101	-	-	0.004	-	*0.262*	*0.169*	-	-	<0.008	-	-	-	-	-	-	-	0.12	0.004	0.011	-	0.004	-	-	-
Xylene (o)	7.200[#18]	**0.82**[#10]			0.036	0.023	-	-	<0.004	-	0.049	0.054	-	-	<0.004	-	-	-	-	-	-	-	0.031	<0.004	<0.004	-	<0.004	-	-	-
Total BTEX					0.263	0.159	-	-	0.0095	-	2.232	1.177	-	-	<0.019	-	-	-	-	-	-	-	0.213	0.0095	0.0165	-	0.0095	-	-	-
Oxygenates																														
MTBE	5.740[#19]	**0.686**[#17]	*0.0991*[#14]		<0.006	<0.006	-	-	<0.006	-	<0.006	<0.006	-	-	<0.006	-	-	-	-	-	-	-	<0.006	<0.006	<0.006	-	<0.006	-	-	-
SVOC																														
2-methylnaphthalene	3.000[#11]	**0.789**[#10]			**1.998**	**1.136**	-	-	<0.01	-	**2.857**	**4.537**	-	-	<0.01	-	-	-	-	-	-	-	<0.1	0.127	0.053	-	0.044	-	-	-
4-bromophenyl phenyl ether					<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
4-chlorophenyl phenyl ether					<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Azobenzene	26[#11]	**0.0024**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-

Number of Result	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline	Number of Guideline Exceedances
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	10	0
10	1	<0.003	0.263	0.263	0.263	0.029	0.003	0.082	10	1
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	10	0
10	5	<0.006	0.091	0.833	0.833	0.2	0.0485	0.3	1	1
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	10	0
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	10	0
10	5	0.005	0.005	<0.01	0.005	0.0075	0.0075	0.0026	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	3	<0.003	0.02	0.051	0.051	0.014	0.003	0.019	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
1	1	4.705	4.705	4.705	4.705		4.705		0	0
1	1	2.325	2.325	2.325	2.325		2.325		0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	10	0
3	3	1.528	1.528	7.253	7.253	3.7	2.465	3.1	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	1	<0.003	0.024	0.024	0.024	0.0051	0.003	0.0066	0	0
3	3	0.292	0.292	2.269	2.269	1.1	1.088	0.2	0	0
10	1	<0.004	0.063	0.063	0.063	0.0099	0.004	0.019	0	0
10	1	<0.004	0.056	0.056	0.056	0.0092	0.004	0.016	0	0
10	3	<0.004	0.075	1.185	1.185	0.14	0.004	0.37	0	0
10	2	<0.004	0.05	0.203	0.203	0.029	0.004	0.063	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
2	2	0.246	0.246	2.398	2.398		1.01275		0	0
10	5	0.009	0.009	<0.018	0.009	0.014	0.0135	0.0047	0	0
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	10	0
10	0	<0.006	ND	<0.006	ND	0.006	0.006	0	10	0
10	0	<0.006	ND	<0.006	ND	0.006	0.006	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.006	ND	<0.006	ND	0.006	0.006	0	0	0
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	10	0
10	1	<0.003	0.005	0.005	0.005	0.0032	0.003	0.00063	0	0
10	0	<0.007	ND	<0.007	ND	0.007	0.007	0	0	0
10	2	<0.03	0.041	0.078	0.078	0.036	0.03	0.015	10	2
10	5	0.013	0.013	<0.026	0.013	0.02	0.0195	0.0069	0	0
10	5	0.004	0.004	<0.008	0.004	0.006	0.006	0.0021	0	0
10	5	0.0115	0.0115	<0.023	0.0115	0.017	0.01725	0.0061	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	0	<0.005	ND	<0.005	ND	0.005	0.005	0	0	0
10	0	<0.002	ND	<0.002	ND	0.002	0.002	0	10	0
10	0	<0.007	ND	<0.007	ND	0.007	0.007	0	10	0
10	0	<0.007	ND	<0.007	ND	0.007	0.007	0	10	0
10	1	<0.004	ND	0.926	0.926	0.05	0.004	0.15	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.004	ND	<0.004	ND	0.004	0.004	0	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	0	<0.002	ND	<0.002	ND	0.002	0.002	0	0	0
10	1	<0.004	ND	1.372	1.372	0.072	0.004	0.22	1	1
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	3	0
10	5	0.007	0.007	<0.014	0.007	0.011	0.0105	0.0037	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	10	0
10	0	<0.001	ND	<0.001	ND	0.001	0.001	0	0	0
10	0	<0.002	ND	<0.002	ND	0.002	0.002	0	0	0
10	0	<0.003	ND	<0.003	ND	0.003	0.003	0	0	0
10	1	<0.01	1.651	1.651	1.651	0.2	0.01	0.51	1	1
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	5	<0.01	0.041	1.072	1.072	0.21	0.075	0.35	10	5
10	5	<0.01	0.056	1.52	1.52	0.27	0.0945	0.48	0	0
10	5	<0.01	0.089	1.089	1.089	0.26	0.1	0.4	10	5
10	5	<0.01	0.158	1.19	1.19	0.28	0.129	0.39	0	0
10	5	<0.01	0.114	0.857	0.857	0.21	0.107	0.28	8	5
10	5	<0.01	0.104	0.591	0.591	0.18	0.102	0.22	10	5
10	8	0.01	0.01	0.854	0.854	0.26	0.151	0.31	0	0
10	5	<0.01	0.044	0.333	0.333	0.1	0.075	0.1	8	5
10	5	<0.01	0.258	3.179	3.179	0.68	0.179	1.1	0	0
10	5	<0.01	0.038	0.346	0.346	0.1	0.075	0.11	2	2
10	4	<0.01	0.023	1.569	1.569	0.2	0.0275	0.48	10	4
10	1	<0.01	2.305	2.305	2.305	0.27	0.01	0.72	1	1
10	5	<0.01	0.037	0.263	0.263	0.094	0.0735	0.089	0	0
10	2	<0.01	0.066	1.36	1.36	0.13	0.0185	0.26	5	2
10	8	0.02	0.02	2.044	2.044	0.56	0.3205	0.69	0	0
10	5	<0.01	0.11	7.6	7.6	1	0.105	2.4	2	2
10	6	<0.01	0.091	4.18	4.18	1	0.105	1.5	3	3
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	2	<0.1	1.926	3.119	3.119	0.85	0.55	1	10	2
10	0	<0.1	ND	<1	ND	0.37	0.1	0.43	10	0
10	0	<0.1	ND	<1	ND	0.37	0.1	0.43	3	0
10	0	<0.1	ND	<1	ND	0.37	0.1	0.43	0	0
10	0	<0.1	ND	<1	ND	0.37	0.1	0.43	3	0
10	0	<0.1	ND	<1	ND	0.37	0.1	0.43	3	0
1	1	3.906	3.906	3.906	3.906		3.906		0	0
1	1	1.413	1.413	1.413	1.413		1.413		0	0
2	2	2.246	2.246	2.517	2.517		2.3815		0	0
1	1	12.91	12.91	12.91	12.91		12.91		0	0
10	0	<0.1	ND	<0.1	ND	0.1	0.1	0	0	0
10	2	<0.1	0.2	1.3	1.3	0.23	0.1	0.38	0	0
10	4	<0.1	0.3	5.6	5.6	0.86	0.1	1.7	0	0
10	7	<0.2	4.9	588.8	588.8	116	16.45	196	0	0
10	8	<4	9	1627	1627	411	176	541	0	0
10	8	<7	26	2885	2885	863	612.5	946	0	0
10	9	7	7	8057	8057	2651	2114	2689	0	0
10	8	<7	82	5172	5172	1788	1501.5	1749	0	0
10	8	<19	117	10274	10274	3179	2306.5	3392	0	0
10	0	<0.1	ND	<0.1	ND	0.1	0.1	0	10	0
10	0	<0.1	ND	<0.1	ND	0.1	0.1	0	0	0
10	0	<0.1	ND	<0.1	ND	0.1	0.1	0	0	0
10	4	<0.2	10.3	103.8	103.8	24	0.2	41	4	4
10	6	<4	32	809	809	204	34.5	308	6	6
10	7	<7	17	3404	3404	837	339.5	1145	7	7
10	8	<7	40	8205	8205	2540	1685.5	2848	7	7
10	8	<19	40	12511	12511	3604	2059.5	4307	0	0
10	8	<38	292	22785	22785	6783	3418.5	7597	0	0
10	5	<0.005	0.028	1.926	1.926	0.16	0.0165	0.32	10	5
10	5	<0.003	0.005	0.019	0.019	0.0067	0.004	0.0057	0	0
10	5	<0.003	0.024	0.121	0.121	0.029	0.0135	0.038	1	1
10	6	<0.004	0.009	0.213	0.213	0.063	0.0435	0.071	0	0
10	9	0.004	0.004	0.262	0.262	0.083	0.056	0.091	3	3
10	5	<0.004	0.023	0.054	0.054	0.021	0.0135	0.02	0	0
10	9	0.0095	0.0095	2.232	2.232	0.41	0.089	0.73	0	0
10	0	<0.006	ND	<0.006	ND	0.006	0.006	0	0	0
10	7	<0.01	0.044	4.537	4.537	1.1	0.1135	1.6	4	4
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0

Human Health Soils Risk Assessment

Analyte	Human Health GAC	Controlled waters GAC		I.D.	BH01	BH02	BH03	BH04	BH05	BH06	TP01	TP02	TP04	TP05	TP06	TP07	TP08	TP09	TP10	TT01	TT02	TT03	WS01	WS02	WS03	WS04	WS05	WS06	WS07	WS08
		Drinking Water Standard	Coastal Environmental Quality Standard	Depth (m)	0.575	0.8	1.75	0.85	2.025	0.55	0.8	0.4	0.9	0.6	0.5	1.45	0.35	0.35	0.5	1.8	0.85	0.7	1.125	0.25	0.6	0.5	0.75	0.6	0.55	0.6
				Date	05/04/2018	11/04/2018	10/04/2018	16/04/2018	17/04/2018	05/04/2018	11/04/2018	11/04/2018	10/04/2018	10/04/2018	10/04/2018	09/04/2018	09/04/2018	09/04/2018	06/04/2018	09/04/2018	06/04/2018	06/04/2018	06/04/2018	10/04/2018	10/04/2018	06/04/2018	10/04/2018	11/04/2018	11/04/2018	11/04/2018
Bis(2-chloroethoxy) methane	2,500[#11]	**0.00545**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Bis(2-chloroethyl)ether	1[#11]	**0.0000112**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Carbazole					<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Dibenzofuran	1,000[#11]	**0.407**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	**0.818**	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Hexachlorocyclopentadiene	7.5[#11]	**0.82**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Hexachloroethane	24.3[#19]	**0.00724**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
1-Methylnaphthalene	73[#11]	**0.0187**[#10]			-	-	-	-	-	-	**3.064**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic Acid	3,300,000[#11]	**13.9**[#10]			-	-	-	-	-	-	-	1.725	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 1-methyl-					-	-	-	-	-	-	6.045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene, 1-methyl-					-	-	-	-	-	-	-	8.606	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, 1-ethyl-2,3-dimethyl-					1.034	-	-	-	-	-	-	1.224	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexane, 3-methyl					-	-	-	-	-	-	-	0.783	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methyl-4-ethyl 2-phenylsuccinate					-	-	-	-	-	-	-	6.689	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene, 1-methyl-					-	-	-	-	-	-	2.957	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 2-methyl-					-	-	-	-	-	-	-	9.265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Azulene, 7-ethyl-1,4-dimethyl-					-	-	-	-	-	-	2.686	1.926	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene, 1,3-dimethyl-					-	-	-	-	-	-	2.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene, 4-methyl-					-	-	-	-	-	-	5.121	3.804	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Cyclopentadiene, 1,2,3,4-tetramethyl-					0.396	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, (1-methyl-1-butenyl)-					-	-	-	-	-	-	-	2.858	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane, butyl-					-	-	-	-	-	-	-	0.657	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentadecane, 2,6,10-trimethyl-					-	-	-	-	-	-	-	8.945	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D-Homoandrostane, (5.alpha.,13.alpha.)-					-	-	-	-	-	-	1.244	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amino Aliphatics																														
N-nitrosodi-n-propylamine	0.33[#11]	**0.00000309**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Anilines																														
2-nitroaniline	8,000[#11]	**0.176**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
3-nitroaniline					<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
4-chloroaniline	11[#11]	**0.000385**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
4-nitroaniline	110[#11]	**0.00707**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Explosives																														
2,4-Dinitrotoluene	3,760[#19]	**0.000349**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
2,6-dinitrotoluene	1,880[#19]	**0.0000833**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Nitrobenzene	22[#11]	**8 to 63**[#3]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Solvents																														
Cyclohexane	27,000[#11]				0.461	-	-	-	-	-	-	1.11 - 3.109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decane					-	-	-	-	-	-	-	0.425 - 2.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptane					-	-	-	-	-	-	-	0.955 - 1.611	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexane	2,500[#11]	**16.1**[#10]			-	-	-	-	-	-	-	2.024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	2,400[#11]	**0.0397**[#10]			<0.1	<0.1	-	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.1	<0.01	<0.01	-	<0.01	-	-	-
Octane					-	-	-	-	-	-	-	1.479 - 3.026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentane	3,400[#11]				0.299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																														
Arsenic	640[#18]	**5**[#1]	*12.5*[#6]		***0 - 21***	***0 - 35.8***	**8.9**	**9.3**	**8**	**10.7**	***26.3***	***21.6***	**7.4**	**9**	**10.3**	**9.4**	**7.2**	**6.8**	**10.7**	**9**	**10.8**	**9.8**	***0 - 16.3***	**11.4**	**7.3**	**8.9**	**10.5**	**6.4**	**7.9**	***12.7***
Barium	22,100[#19]	**53.3**[#3]			**0 - 504**	**0 - 350**	**133**	**127**	**129**	**163**	**369**	**337**	**116**	**162**	**118**	**127**	**117**	**65**	**112**	**112**	**144**	**98**	**0 - 310**	**121**	**169**	**169**	**147**	**133**	**120**	**116**
Beryllium	12[#18]	**20.4**[#3]			0 - 2.1	0 - 2.3	1.2	1.4	1.2	4.2	1.9	1.8	1.1	1.3	1.3	1.3	1.4	0.7	1.3	1.4	1.5	1	0 - 1.9	1.3	1.5	1.3	1.5	1.4	1	1.3
Boron	240,000[#18]	**10**[#1]	*70.3*[#13]		0 - 2.9	0 - 4.2	0.8	1	1	2.5	3.4	3.6	1.5	1.6	4.4	1	1.2	0.9	1.5	1.7	1.7	1.2	0 - 2.6	1.8	3.4	2.1	2.2	1	1.2	1.1
Cadmium	190[#18]	**0.5**[#1]	*0.02*[#8]		***0 - 3.1***	***0 - 1.7***	*0.2*	*0.2*	*0.1*	<0.1	***1.8***	***0.8***	*0.2*	*0.2*	*0.3*	*0.2*	<0.1	*0.3*	*0.2*	*0.2*	*0.2*	*0.1*	***0 - 1.6***	*0.3*	*0.2*	<0.1	*0.4*	*0.2*	***0.6***	*0.2*
Chromium (hexavalent)	33[#18]		*0.0108*[#6]		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium (III+VI)	8,600[#18]				0 - 79.8	0 - 82.2	59.8	62.1	34.6	81.5	75.1	63.4	64	60.4	36	69	81.4	44.9	87.6	52.6	75.9	106	0 - 68.7	60	65.2	85.2	71.5	50.1	67	112
Chromium (Trivalent)	8,600[#18]				0 - 79.8	0	59.8	62.1	34.6	81.5	-	-	64	60.4	0	69	81.4	44.9	87.6	52.6	75.9	106	0 - 68.7	60	65.2	85.2	71.5	50.1	67	112
Copper	68,000[#18]	**200**[#1]	*0.376*[#6]		*0 - 148*	***0 - 291***	*11*	*14*	*11*	*13*	***205***	*158*	*11*	*15*	*18*	*9*	*15*	*11*	*21*	*16*	*21*	*13*	*0 - 113*	*20*	*45*	*15*	*28*	*10*	*8*	*6*
Lead	2,300[#15]	**26.9**[#1]	*3.5*[#8]		***0 - 124***	***0 - 126***	*13*	*12*	*12*	*15*	***103***	***71***	*9*	*11*	***28***	*15*	*15*	*11*	*26*	*13*	*20*	*19*	***0 - 73***	*22*	***42***	*16*	***34***	*10*	*21*	*19*
Mercury	1,100[#18]				0 - 1.7	<0.1 - 0	<0.1	<0.1	<0.1	<0.1	2.3	1.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 - 0	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	980[#18]	**10**[#1]	*4.3*[#8]		***0 - 163.1***	***0 - 111.9***	***39.4***	***30.2***	***29.6***	***19.7***	***121.9***	***81.6***	***26.5***	***28.2***	***29.7***	***28.6***	***37.3***	***19***	***26.4***	***32.4***	***30.9***	***23***	***0 - 92.4***	***36.1***	***45.8***	***30.1***	***29.8***	***33.3***	***22.3***	***27.6***
Selenium	12,000[#18]	**0.5**[#1]			**0 - 10**	**0 - 4**	<1	<1	<1	**2**	**4**	**4**	**2**	**2**	<1	**2**	<1	**2**	<1	**2**	<1	**1**	**0 - 4**	**1**	<1	**2**	**2**	<1	<1	**1**
Vanadium	9,000[#18]	**1.09**[#10]	*1.26*[#13]		***0 - 338***	***0 - 227***	***42***	***49***	***36***	***79***	***275***	***186***	***39***	***45***	***58***	***46***	***52***	***30***	***56***	***46***	***62***	***56***	***0 - 231***	***67***	***87***	***54***	***69***	***45***	***40***	***53***
Zinc	730,000[#18]	**228**[#10]	*0.259*[#6]		***0 - 1,275***	***0 - 937***	*61*	*55*	*59*	*53*	***947***	***623***	*50*	*56*	*84*	*62*	*66*	*73*	*106*	*61*	*71*	*57*	***0 - 663***	*131*	***231***	*67*	*149*	*113*	*93*	*79*
Organics																														
Organic Matter (%)					0	0	0.7	0.6	0.6	1.2	-	-	0.6	1	0	0.8	0.7	0.7	2	0.7	2.1	1.5	0	2	7.9	1	3.9	0.6	1.1	0.9
Inorganics																														
Ammoniacal Nitrogen as N			*21 (unionised ammonia)*[#6]		-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammoniacal Nitrogen as NH4					39.3	12.8	<0.6	-	-	0.8	41.7	13.5	<0.6	<0.6	8.3	<0.6	<0.6	<0.6	1.5	<0.6	<0.6	<0.6	30.5	2.6	20.2	<0.6	14.2	<0.6	<0.6	<0.6
Chloride					0 - 39	0 - 11	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 89	1,582	58	-	54	-	-	-
Fluoride	47,000[#11]				4.5	11.2	-	-	<0.3	-	8	16.4	-	-	6.9	-	-	-	-	-	-	-	3.7	0.9	2.3	-	3.7	-	-	-
Nitrate (as N)					-	<2.5 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate (as NO3-)	1,900,000[#11]				<2.5 - 0	-	-	-	<2.5	-	<2.5	<2.5	-	-	<2.5 - 0	-	-	-	-	-	-	-	<2.5 - 0	<2.5	<2.5	-	<2.5	-	-	-
pH (Lab) (pH units)					7.31	7.17	8.27	7.91	8.12	8.07	7.22	7.67	8.09	8.52	7.67	8.25	7.85	8.46	7.26	7.97	7.78	7.69	7.29	7.52	7.34	8.5	7.55	8.28	8.32	7.86
Sulphide					53	<10	-	-	-	-	30	21	-	-	<10	-	-	-	-	-	-	-	25	<10	53	-	<100	-	-	-
Total Sulphate					0 - 8,841	0 - 44,355	-	-	439	-	16,251	6,783	-	-	856	-	-	-	-	-	-	-	0 - 10,971	701	6,510	-	2,252	-	-	-
Asbestos																														
Asbestos Type					Chrysotile	Chrysotile	NAD	NAD	NAD	NAD	Chrysotile	Chrysotile	NAD	NAD	Chrysotile	NAD	NAD	NAD	NAD	NAD	NAD	NAD	Chrysotile	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Level					<0.1	<0.1	NAD	NAD	NAD	NAD	<0.1	<0.1	NAD	NAD	<0.1	NAD	NAD	NAD	NAD	NAD	NAD	NAD	<0.1	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Gravimetric & PCOM Total					<0.001	-	-	-	-	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	-
Asbestos Gravimetric Quantification (ACMs)					<0.001	-	-	-	-	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	-
Asbestos fibres					Fibre bundles	Fibre bundles	-	NAD	NAD	NAD	Fibre bundles	Fibre bundles	NAD	NAD	Fibre bundles	NAD	NAD	NAD	NAD	NAD	NAD	NAD	Fibre bundles	NAD	NAD	NAD	NAD	-	-	-
Other																														
1,4-Methanonaphthalene					-	-	-	-	-	-	4.447	3.154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1H-Indene, 2,3-dihydro-1,6-dimethyl-					-	-	-	-	-	-	-	7.319	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylpentane					-	-	-	-	-	-	-	0.334	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antra-9,10-quinone					-	-	-	-	-	-	3.885	1.164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonyl Sulphide	280[#11]				-	0.186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane, 1,2,3-trimethyl-, (1.a.,2.b.,3.a.)-					0.372	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane, 1,2,4-trimethyl-, (1.a.,2.b.,4.b.)-					0.34	-	-	-	-	-	-	0.664	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane, 1,2-dimethyl-, trans-					0.35	-	-	-	-	-	-	2.017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclopentane, 1,2,4-trimethyl-					-	-	-	-	-	-	-	0.957	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzothiophene (µg/kg)	12,000,000[#11]	**999,000,000,000,001**[#10]			-	-	-	-	-	-	5,352	5,853	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dodecane					-	-	-	-	-	-	6.256	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eicosane					-	-	-	-	-	-	-	2.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethyl 2-Chloro Acetoacetate					-	-	-	-	-	-	-	1.565	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Natural Moisture Content (%)					0	0	17.1	16	16.5	20.9	-	-	17.6	23.8	-	13.7	22	11.9	17.1	21.1	20.5	15.5	0	20.7	34.3	17.5	22	20.4	17.6	24.9
Nonane	72[#11]				0.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Octadecane					-	-	-	-	-	-	-	2.717	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Octadecanoic Acid					-	-	-	-	-	-	-	0.519	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentane, 2,3-dimethyl					0.163	-	-	-	-	-	-	0.828	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentane, 2,4-dimethyl-					-	-	-	-	-	-	-	0.154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetracosane					0.623	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Number of Result	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline	Number of Guideline Exceedances
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	1	<0.01	0.818	0.818	0.818	0.12	0.01	0.25	1	1
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
1	1	3.064	3.064	3.064	3.064		3.064		1	1
1	1	1.725	1.725	1.725	1.725		1.725		0	0
1	1	6.045	6.045	6.045	6.045		6.045		0	0
1	1	8.606	8.606	8.606	8.606		8.606		0	0
2	2	1.034	1.034	1.224	1.224		1.129		0	0
1	1	0.783	0.783	0.783	0.783		0.783		0	0
1	1	6.689	6.689	6.689	6.689		6.689		0	0
1	1	2.957	2.957	2.957	2.957		2.957		0	0
1	1	9.265	9.265	9.265	9.265		9.265		0	0
2	2	1.926	1.926	2.686	2.686		2.306		0	0
1	1	2.93	2.93	2.93	2.93		2.93		0	0
2	2	3.804	3.804	5.121	5.121		4.4625		0	0
1	1	0.396	0.396	0.396	0.396		0.396		0	0
1	1	2.858	2.858	2.858	2.858		2.858		0	0
1	1	0.657	0.657	0.657	0.657		0.657		0	0
1	1	8.945	8.945	8.945	8.945		8.945		0	0
1	1	1.244	1.244	1.244	1.244		1.244		0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	10	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	0	0
2	2	0.461	0.461	3.109	3.109		1.28525		0	0
1	1	0.425	0.425	2.04	2.04		1.2325		0	0
1	1	0.955	0.955	1.611	1.611		1.283		0	0
1	1	2.024	2.024	2.024	2.024		2.024		0	0
10	0	<0.01	ND	<0.1	ND	0.037	0.01	0.043	3	0
1	1	1.479	1.479	3.026	3.026		2.2525		0	0
1	1	0.299	0.299	0.299	0.299		0.299		0	0
26	26	0	6.4	35.8	35.8	11	9.35	4.6	26	26
26	26	0	65	504	504	153	131	68	26	26
26	26	0	0.7	4.2	4.2	1.4	1.3	0.62	0	0
26	26	0	0.8	4.4	4.4	1.8	1.5	0.95	0	0
26	23	0	0.1	3.1	3.1	0.4	0.2	0.44	26	23
26	0	<0.3	ND	<0.3	ND	0.3	0.3	0	26	0
26	26	0	34.6	112	112	65	63.7	20	0	0
24	24	0	34.6	112	112	61	63.05	27	0	0
26	26	0	6	291	291	37	15	52	26	26
26	26	0	9	126	126	28	19	23	26	26
26	6	0	0.2	2.3	2.3	0.28	0.1	0.54	0	0
26	26	0	19	163.1	163.1	39	30.15	23	26	26
26	16	0	1	10	10	1.8	1.5	1.1	26	16
26	26	0	30	338	338	76	55	56	26	26
26	26	0	50	1275	1275	184	76	230	26	26
24	24	0	0.6	7.9	7.9	1.3	0.75	1.7	0	0
1	0	<0.6	ND	<0.6	ND		0.6		0	0
24	11	<0.6	0.8	41.7	41.7	8.1	0.6	13	0	0
7	7	0	17	1582	1582	254	44.5	586	0	0
10	9	<0.3	0.9	16.4	16.4	5.8	4.1	5	0	0
1	1	2.5	ND	0	ND		1.25		0	0
9	3	<2.5	ND	<2.5	ND	2.1	2.5	0.63	0	0
26	26	7.17	7.17	8.52	8.52	7.8	7.855	0.43	0	0
9	5	<10	21	<100	53	35	25	30	0	0
10	10	0	439	44355	44355	6588	4953	7199	0	0
0	0	99999	ND	0	ND				0	0
6	0	<0.1	ND	<0.1	ND	0.1	0.1	0	0	0
5	0	<0.001	ND	<0.001	ND	0.001	0.001	0	0	0
5	0	<0.001	ND	<0.001	ND	0.001	0.001	0	0	0
0	0	99999	ND	0	ND				0	0
2	2	3.154	3.154	4.447	4.447		3.8005		0	0
1	1	7.319	7.319	7.319	7.319		7.319		0	0
1	1	0.334	0.334	0.334	0.334		0.334		0	0
2	2	1.164	1.164	3.885	3.885		2.5245		0	0
1	1	0.186	0.186	0.186	0.186		0.186		0	0
1	1	0.372	0.372	0.372	0.372		0.372		0	0
2	2	0.34	0.34	0.664	0.664		0.502		0	0
2	2	0.35	0.35	2.017	2.017		1.1835		0	0
1	1	0.957	0.957	0.957	0.957		0.957		0	0
2	2	5352	5352	5853	5853		5602.5		0	0
1	1	6.256	6.256	6.256	6.256		6.256		0	0
1	1	2.08	2.08	2.08	2.08		2.08		0	0
1	1	1.565	1.565	1.565	1.565		1.565		0	0
23	23	0	11.9	34.3	34.3	17	17.6	8.1	0	0
1	1	0.82	0.82	0.82	0.82		0.82		0	0
1	1	2.717	2.717	2.717	2.717		2.717		0	0
1	1	0.519	0.519	0.519	0.519		0.519		0	0
2	2	0.163	0.163	0.828	0.828		0.4955		0	0
1	1	0.154	0.154	0.154	0.154		0.154		0	0
1	1	0.623	0.623	0.623	0.623		0.623		0	0

All units are in mg/kg unless stated
All grey values were reported below the MDL
MDL-Method Detection Limit
NAD-No Asbestos Detected

Comments
#1 WS Regs 2016 (Eng/Wal)
#2 WHO Petroleum DWG 2008
#3 WHO DWG 2017
#4 WHO 2017 - Taste
#5 WHO 2017 - Odour
#6 WFD England/Wales. 2015 - Saltwater Standards
#7 WFD England/Wales. 2015 - MAC-EQS Trans./Coastal
#8 WFD England/Wales. 2015 - AA-EQS Trans./Coastal
#9 Water Env't Regs (Scotland) 2015. AA-EQS Coast
#10 USEPA RSL (tapwater) [June 2017]
#11 USEPA RSL (June 2017)
#12 SEPA WAT-SG-53 Marine EQS - MAC - 2015
#13 SEPA WAT-SG-53 Marine EQS - AA - 2015
#14 PNEC (EU REACH) - Coastal
#15 Defra C4SL 12/2014
#16 California Draft health protective concentration
#17 AECOM DWG (WHO method)
#18 AECOM (modified LQM/CIEH S4ULs)
#19 AECOM (modified EIC)
GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
DWS: Drinking Water Standard
EQS: Environmental Quality Standard
HH: Human Health

Key

🟩 XXX	Exceedance of HH Soil. Commercial/Industrial. Sand. TOC >=1.45 to <3.48%
XXX	Exceedance of GAC_WTV_EN/WA_DWS_SAND1%TOC
XXX	Exceedance of GAC_WTV_EN/WA_EQS-Coast_SAND1%TOC

Groundwater Contamination Risk Assessment

Analyte	Drinking Water Standard	Coastal Environmental Quality Standard	Location	BH01	BH02	BH03	WS03	WS04	WS05	WS06	Numbe	Number of	Minimum	Minimum	Maximum	Maximum	Average	Median	Standard	Number	Number of
			Date	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018	10/05/2018											
VOC																					
1,1,1,2-tetrachloroethane	0.57$^{\#10}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	4	0
1,1,2,2-tetrachloroethane	0.076$^{\#10}$			-	-	-	<4	<4	<4	<4	4	0	<4	ND	<4	ND	4	4	0	4	0
1,1-dichloropropene				-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
1,2,3-trichloropropane	0.00075$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	4	0
1,2,4-trimethylbenzene	56$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
1,2-dibromo-3-chloropropane	1$^{\#3}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	4	0
1,2-dichloroethane	3$^{\#1}$	**10$^{\#8}$**		-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
1,2-Dichloroethene	50$^{\#3}$			-	-	-	<6	<6	<6	<6	4	0	<6	ND	<6	ND	6	6	0	0	0
1,2-dichloropropane	40$^{\#3}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
1,3,5-trimethylbenzene	60$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
1,3-dichloropropane	370$^{\#10}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
2,2-dichloropropane				-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Bromochloromethane	83$^{\#10}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Bromodichloromethane	100$^{\#1}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Bromoform	100$^{\#1}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Chlorodibromomethane	100$^{\#1}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
cis-1,3-dichloropropene				-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Dibromomethane	8.3$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Hexachlorobutadiene	0.1$^{\#1}$	**0.6$^{\#7}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Isopropylbenzene	450$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
n-butylbenzene	1,000$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
n-propylbenzene	660$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
p-isopropyltoluene				-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
sec-butylbenzene	2,000$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Styrene	20$^{\#3}$	**50$^{\#12}$**		-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
tert-butylbenzene	690$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
trans-1,3-dichloropropene				-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Trihalomethanes	100$^{\#1}$			-	-	-	<8	<8	<8	<8	4	0	<8	ND	<8	ND	8	8	0	0	0
VOC TICs				-	-	-	1	1	1	1	4	4	1	1	1	1	1	1	0	0	0
Chlorinated Hydrocarbons																					
1,1,1-trichloroethane	2,000$^{\#3}$	**100$^{\#12}$**		-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
1,1,2-trichloroethane	0.28$^{\#10}$	**300$^{\#12}$**		-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	4	0
1,1-dichloroethane	2.8$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	4	0
1,1-dichloroethene	140$^{\#3}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Carbon tetrachloride	3$^{\#1}$	**12$^{\#8}$**		-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Chloroethane	21,000$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Chloroform	100$^{\#1}$	**2.5$^{\#8}$**		-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Chloromethane	190$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
cis-1,2-dichloroethene	50$^{\#3}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Dichloromethane	20$^{\#3}$	**20$^{\#8}$**		-	-	-	<5	<5	<5	<5	4	0	<5	ND	<5	ND	5	5	0	0	0
PCE+TCE+DCE+VC				-	-	-	<15.1	<15.1	<15.1	<15.1	4	0	<15.1	ND	<15.1	ND	15	15.1	0	0	0
Sum of PCE and TCE	10$^{\#1}$			-	-	-	<6	<6	<6	<6	4	0	<6	ND	<6	ND	6	6	0	0	0
TCE+DCE+VC				-	-	-	<12.1	<12.1	<12.1	<12.1	4	0	<12.1	ND	<12.1	ND	12	12.1	0	0	0
Tetrachloroethene	Use PCE + TCE$^{\#1}$	**10$^{\#8}$**		-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
trans-1,2-dichloroethene	50$^{\#3}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Trichloroethene	10$^{\#1}$	**10$^{\#8}$**		-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Vinyl chloride	0.5$^{\#1}$			-	-	-	<0.1	<0.1	<0.1	<0.1	4	0	<0.1	ND	<0.1	ND	0.1	0.1	0	0	0
Halogenated Benzenes																					
1,2,3-trichlorobenzene	0.1$^{\#1}$	**0.4$^{\#8}$**		-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	4	0
1,2,4-trichlorobenzene	0.1$^{\#1}$	**0.4$^{\#8}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
1,2-dichlorobenzene	1,000$^{\#3}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
1,3-dichlorobenzene				-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
1,4-dichlorobenzene	300$^{\#3}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
2-chlorotoluene	240$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
4-chlorotoluene	250$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
Bromobenzene	62$^{\#10}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Chlorobenzene	300$^{\#3}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Hexachlorobenzene	0.1$^{\#1}$	**0.05$^{\#7}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Trichlorobenzene (total)	0.1$^{\#1}$	**0.4$^{\#8}$**		-	-	-	<4	<4	<4	<4	4	0	<4	ND	<4	ND	4	4	0	4	0
Halogenated Hydrocarbons																					
Dichlorodifluoromethane	200$^{\#10}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	0	0
Bromomethane	7.5$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Trichlorofluoromethane	5,200$^{\#10}$			-	-	-	<3	<3	<3	<3	4	0	<3	ND	<3	ND	3	3	0	0	0
1,2-dibromoethane	0.4$^{\#3}$			-	-	-	<2	<2	<2	<2	4	0	<2	ND	<2	ND	2	2	0	4	0
PAH																					
Acenaphthene	18$^{\#15}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Acenaphthylene	18$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Anthracene	90$^{\#15}$	**0.1$^{\#8}$**		-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
Benz(a)anthracene	3.5$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Benzo(a) pyrene	0.01$^{\#1}$	**0.00017$^{\#8}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Benzo(b)&(k)fluoranthene				-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Benzo(g,h,i)perylene	0.1$^{\#1}$	**0.00082$^{\#7}$**		-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene				-	-	-	<1.5	<1.5	<1.5	<1.5	4	0	<1.5	ND	<1.5	ND	1.5	1.5	0	0	0
Chrysene	7$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Dibenz(a,h)anthracene	0.07$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
Fluoranthene	4$^{\#3}$	**0.0063$^{\#8}$**		-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
Fluorene	12$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Indeno(1,2,3-c,d)pyrene	0.1$^{\#1}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Naphthalene	6$^{\#15}$	**2$^{\#8}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
PAHs (sum of 4)	0.1$^{\#1}$			-	-	-	<1.5	<1.5	<1.5	<1.5	4	0	<1.5	ND	<1.5	ND	1.5	1.5	0	4	0
Phenanthrene	4$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Pyrene	9$^{\#15}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Phenolics																					
2,4-dimethylphenol	360$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
2-chloronaphthalene	750$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
2-methylphenol	930$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
2-nitrophenol				-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
4-chloro-3-methylphenol	1,400$^{\#10}$	**40$^{\#12}$**		-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
4-methylphenol	1,900$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
4-nitrophenol				-	-	-	<10	<10	<10	<10	4	0	<10	ND	<10	ND	10	10	0	0	0
Phenol	5,800$^{\#10}$	**7.7$^{\#6}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Halogenated Phenols																					
2,4,5-trichlorophenol	1,200$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
2,4,6-trichlorophenol	200$^{\#3}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
2,4-dichlorophenol	46$^{\#10}$	**0.42$^{\#6}$**		-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
2-chlorophenol	91$^{\#10}$	**50$^{\#12}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Pentachlorophenol	9$^{\#3}$	**0.4$^{\#8}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Phthalates																					
Bis(2-ethylhexyl) phthalate	8$^{\#3}$	**1.3$^{\#8}$**		-	-	-	<5	<5	<5	<5	4	0	<5	ND	<5	ND	5	5	0	4	0
Butyl benzyl phthalate	16$^{\#10}$	**0.75$^{\#6}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Diethylphthalate	15,000$^{\#10}$	**200$^{\#12}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Dimethyl phthalate		**800$^{\#12}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Di-n-butyl phthalate	900$^{\#10}$	**8$^{\#12}$**		-	-	-	<1.5	<1.5	<1.5	<1.5	4	0	<1.5	ND	<1.5	ND	1.5	1.5	0	0	0
Di-n-octyl phthalate	200$^{\#10}$	**20$^{\#12}$**		-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
SVOC																					
2-methylnaphthalene	36$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
4-bromophenyl phenyl ether				-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
4-chlorophenyl phenyl ether				-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
Azobenzene	0.12$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
Bis(2-chloroethoxy) methane	59$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Bis(2-chloroethyl)ether	0.014$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Carbazole				-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Dibenzofuran	7.9$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Hexachlorocyclopentadiene	0.41$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Hexachloroethane	0.33$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Amino Aliphatics																					
N-nitrosodi-n-propylamine	0.011$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
Anilines																					
2-nitroaniline	190$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
3-nitroaniline				-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
4-chloroaniline	0.37$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
4-nitroaniline	3.8$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Explosives																					
2,4-Dinitrotoluene	0.24$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	4	0
2,6-dinitrotoluene	0.049$^{\#10}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	4	0
Nitrobenzene	8 to 63$^{\#3}$			-	-	-	<1	<1	<1	<1	4	0	<1	ND	<1	ND	1	1	0	0	0
TPH																					
>C5-C6 Aliphatics	15,000$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C6-C8 Aliphatics	15,000$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C8-C10 Aliphatics	300$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C10-C12 Aliphatics	300$^{\#2}$			<5	<5	<5	<5	<5	<5	<5	7	0	<5	ND	<5	ND	5	5	0	0	0
>C12-C16 Aliphatics	300$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C16-C21 Aliphatics	300$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C16-C35 Aliphatics				<20	<20	<20	<20	<20	<20	<20	7	0	<20	ND	<20	ND	20	20	0	0	0
>C21-C35 Aliphatics	300$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C5-C35 Aliphatics				<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>EC5-EC7 Aromatics	1$^{\#1}$	**8$^{\#8}$**		<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	7	0
>EC7-EC8 Aromatics	700$^{\#2}$	**74$^{\#6}$**		<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>EC8-EC10 Aromatics	300$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>EC10-EC12 Aromatics	90$^{\#2}$			<5	<5	<5	<5	<5	<5	<5	7	0	<5	ND	<5	ND	5	5	0	0	0
>EC12-EC16 Aromatics	90$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>EC16-EC21 Aromatics	90$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>EC21-EC35 Aromatics	90$^{\#2}$			<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>EC5-EC35 Aromatics				<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
>C5-C35 Aliphatics & Aromatics				<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	10	10	0	0	0
TPH Hazard Indicies	1			0	0	0	0	0	0	0											
BTEX																					
Benzene	1$^{\#1}$	**8$^{\#8}$**		<5	<5	<5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<5	ND	2.4	0.5	2.4	3	0
Toluene	700$^{\#3}$	**74$^{\#6}$**		<5	<5	<5	<5	<5	<5	<5	7	0	<5	ND	<5	ND	5	5	0	0	0
Ethylbenzene	300$^{\#3}$	**20$^{\#12}$**		<5	<5	<5	<1	<1	<1	<1	7	0	<1	ND	<5	ND	2.7	1	2.1	0	0
Xylene (m & p)				<5	<5	<5	<2	<2	<2	<2	7	0	<2	ND	<5	ND	3.3	2	1.6	0	0
Xylene Total	500$^{\#3}$	**30$^{\#12}$**		<10	<10	<10	<3	<3	<3	<3	7	0	<3	ND	<10	ND	6	3	3.7	0	0
Xylene (o)	190$^{\#10}$			<5	<5	<5	<1	<1	<1	<1	7	0	<1	ND	<5	ND	2.7	1	2.1	0	0
Total BTEX				<25	<25	<25	<9.5	<9.5	<9.5	<9.5	7	0	<9.5	ND	<25	ND	16	9.5	8.3	0	0
Oxygenates																					
MTBE	1,800$^{\#15}$	**260$^{\#13}$**		<5	<5	<5	<0.1	2.8	<0.2	<0.1	7	1	<0.1	2.8	<5	2.8	2.6	2.8	2.4	0	0
Solvents																					
Isophorone	78$^{\#10}$			-	-	-	<0.5	<0.5	<0.5	<0.5	4	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Metals																					
Arsenic (Filtered)	10$^{\#1}$	**25$^{\#6}$**		<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	7	0	<2.5	ND	<2.5	ND	2.5	2.5	0	0	0
Barium (Filtered)	1,300$^{\#3}$			57	63	62 - 63	41	53	33	44	7	7	33	33	63	63	51	53	11	0	0
Beryllium (Filtered)	12$^{\#3}$			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0.5	0.5	0	0	0
Boron (Filtered)	1,000$^{\#1}$	**7,000$^{\#12}$**		132	73	<12	49	54	178	34	7	6	<12	34	178	178	76	54	59	0	0
Cadmium (Filtered)	5$^{\#1}$	**0.2$^{\#8}$**		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0.5	0.5	0	7	0
Chromium (hexavalent)	50$^{\#1}$	**0.6$^{\#6}$**		<6	<6	<6	<6	<6	<6	<6	7	0	<6	ND	<6	ND	6	6	0	7	0
Chromium (III+VI) (Filtered)	50$^{\#1}$			6.2	6.8	<1.5 - 6.7	6.3	5.4	3.3	<1.5	7	6	<1.5	3.3	6.8	6.8	4.8	5.4	1.9	0	0
Chromium (Trivalent) (Filtered)	50$^{\#1}$			6	7	<6 - 7	6	<6	<6	<6	7	4	<6	6	7	7	6.2	6	0.39	0	0
Copper (Filtered)	2,000$^{\#1}$	**3.76$^{\#6}$**		<7	<7	<7	<7	<7	<7	<7	7	0	<7	ND	<7	ND	7	7	0	7	0
Ferrous Iron (Filtered)				<20	<20	<20 - 20	100	260	1,630	150	7	5	<20	100	1630	1630	314	100	587	0	0
Lead (Filtered)	10$^{\#1}$	**1.3$^{\#8}$**		<5	<5	<5	<5	<5	<5	<5	7	0	<5	ND	<5	ND	5	5	0	7	0
Mercury (Filtered)	1$^{\#1}$	**0.07$^{\#7}$**		<1	<1	<1	<1	<1	<1	<1	7	0	<1	ND	<1	ND	1	1	0	7	0
Nickel (Filtered)	20$^{\#1}$	**8.6$^{\#8}$**		2	<2	5	4	3	8	4	7	6	<2	2	8	8	4	4	2.1	0	0
Selenium (Filtered)	10$^{\#1}$			<3	5	<3 - 16	<3	<3	<3	<3	7	2	<3	5	16	16	4.2	3	2.4	1	1
Vanadium (Filtered)	86$^{\#10}$	**100$^{\#12}$**		<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	7	0	<1.5	ND	<1.5	ND	1.5	1.5	0	0	0
Zinc (Filtered)	6,000$^{\#10}$	**6.8$^{\#6}$**		**12**	6	**6 - 7**	<3	<3	**10**	6	7	5	<3	6	12	12	6.6	6	3.4	3	3
Organics																					
Dissolved Organic Carbon (mg/L)				<2	<2	<2	6	9	38	3	7	4	<2	3	38	38	8.9	3	13	0	0
Inorganics																					
Sulphate (mg/L)	250$^{\#4}$			62.9	42.8	76.4 - 94.2	417.5	720.3	983.9	299.8	7	7	42.8	42.8	983.9	983.9	373	299.8	363	4	4
Chloride (mg/L)	250$^{\#1}$			24.3	18.2	26.2 - 26.8	563.4	1,280	304.2	69.2	7	7	18.2	18.2	1280	1280	327	69.2	467	3	3
Ortho Phosphate as P (mg/L)				0.19	0.15	<0.03	0.12	<0.03	<0.03	<0.03	7	3	<0.03	0.12	0.19	0.19	0.083	0.03	0.069	0	0
Alkalinity (total) as CaCO3 (mg/L)				352	300	274 - 276	346	378	612	762	7	7	274	274	762	762	432	352	183	0	0
Nitrate (as N) (mg/L)				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	7	0	<0.05	ND	<0.05	ND	0.05	0.05	0	0	0
Ammoniacal Nitrogen as N (mg/L)		**21 (unionised ammonia)$^{\#6}$**		0.42	0.27	0.06	0.06	0.09	0.87	0.05	7	7	0.05	0.05	0.87	0.87	0.26	0.09	0.3	0	0
pH (Lab) (pH units)				7.63	7.4	7.28 - 7.31	6.95	6.83	6.97	7.19	7	7	6.83	6.83	7.63	7.63	7.2	7.19	0.28	0	0
TSS (mg/L)				35	<10	15 - 19	10	14	21	1,787	7	6	<10	10	1787	1787	271	17	669	0	0

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